WAR II SURPLUS
CIRCUITS

ARC 5 XMITTER

calibration will be correct if 1.0 Mc. is mentally added to the dial reading.

Plate and screen voltage should be applied to the p-a stage. The transmitter should be tuned to 7.2 Mc. and loaded to the antenna. The p-a padding condenser *C-67* should be resonated for minimum plate current and then locked. *C-65* should always be re-resonated whenever there is a major change in antenna loading or coupling.

Transmitter Conversion for 20, 15 and 10 Meters

The conversion of the 4.0-5.3 Mc. transmitter for high frequency use is based upon retaining single dial control and the use of one doubler stage.

The space left by the removal of the electron eye tube and the calibrating crystal may be used for a 6AG7 doubler and a slug tuned coil. The basic circuit for 20, 15 and 10 meters is shown in *Figure 22*.

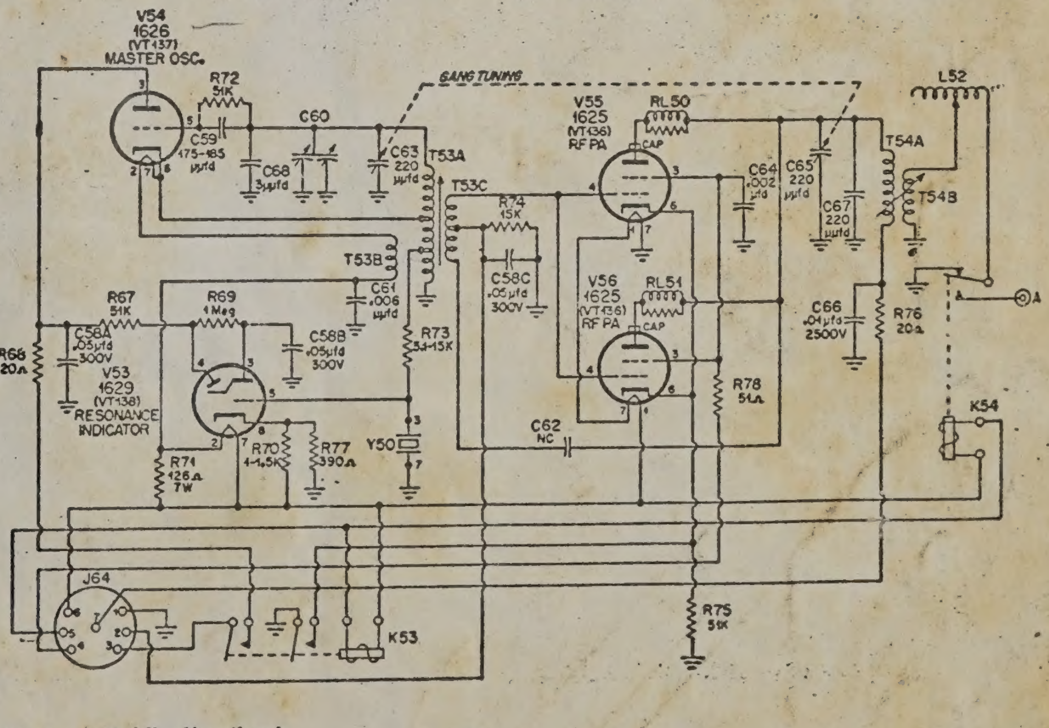
The basic filament and socket modifications as described for the low frequency units should be completed. For 20 and 15 meters, the 6J5 oscillator must work on the 7-Mc. band, using the existing dial calibration lines, with new figures. The main winding of the oscillator coil should be reduced to 12 turns, by removing turns from the *top* of the coil. The oscillator tuning condenser, *C-63*, should have all but two rotor plates removed. One of the remaining plates should be the slotted one for tracking adjustment.

At the oscillator coil terminals under the chassis, *C-62* (the neutralizing condenser) should be removed and the bias return of the doubler stage moved from the center tap of the coil to the free end.

An octal socket is placed in the crystal calibrator socket hole. The electron eye socket hole is covered by a small metal plate. A National *XR-50* slug tuned coil is mounted in the center of this plate with its slug adjustment above the chassis. This coil (*L1*) is wound with 10 turns of No. 24 enamelled wire, spaced to occupy the full winding length. Condenser *C16* con-

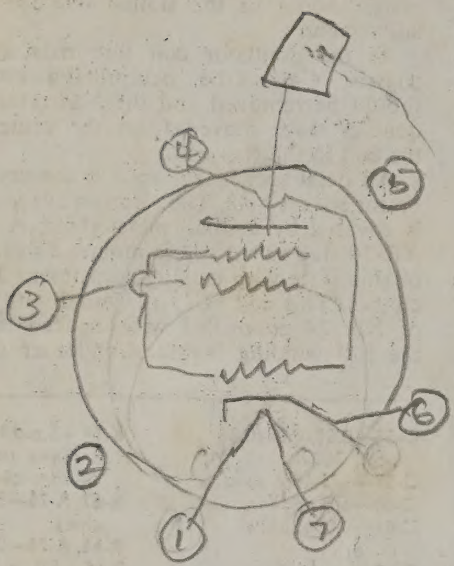
Fig. 18. This is a typical wiring schematic of the 274N series transmitters.

C-58—0.05/0.05/0.05 µfd., 300v.
C-59—175-185 µµfd.
C-60—air padder.
C-61—0.006 µfd., mica.
C-62—neutralizing condenser.
C-63, C-65, C-67—220 µµfd.
C-64—0.002 µfd., 1000v.
C-66—0.01 µfd., 2500v., mica.
C-68—3.0 µµfd., 750 p.p.m.
K-53—D.p.s.t. relay, 300-ohm coil.
K-54—S.p.d.t. antenna relay, 90-ohm coil.
R-67, R-75—51,000 ohms.
R-68, R-76—20 ohms.
R-69—1.0 megohm.
R-70—1000 to 1500 ohms.
R-71—126 ohms, 7w.
R-73—5100 to 15000 ohms.
R-74—15,000 ohms.
R-77—390 ohms.
R-78—51 ohms.
RL-50, RL-51—parasitic suppressors on 51-ohm resistors.



1 grid 3- osc plate thru relay 5 Relay + 28 v
2 - 150 4 - F 6 F

V22 - 5AZ4



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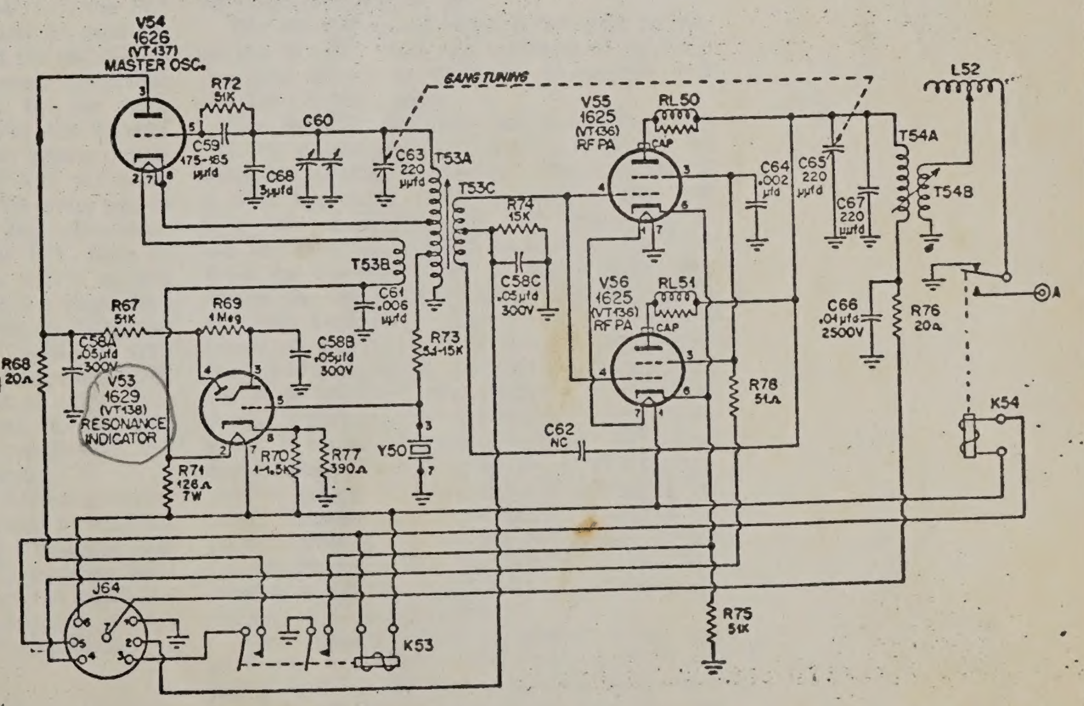
C-64—0.002 µfd., 1000v.
C-66—0.01 µfd., 2500v., mica.
C-68—3.0 µµfd., 750 p.p.m.
K-53—D.p.s.t. relay, 300-ohm coil.
K-54—S.p.d.t. antenna relay, 90-ohm coil.
R-67, R-75—51,000 ohms.
R-68, R-76—20 ohms.
R-69—1.0 megohm.
R-70—1000 to 1500 ohms.
R-71—126 ohms, 7w.
R-73—5100 to 15000 ohms.
R-74—15,000 ohms.
R-77—390 ohms.
R-78—51 ohms.
RL-50, RL-51—parasitic suppressors on 51-ohm resistors.



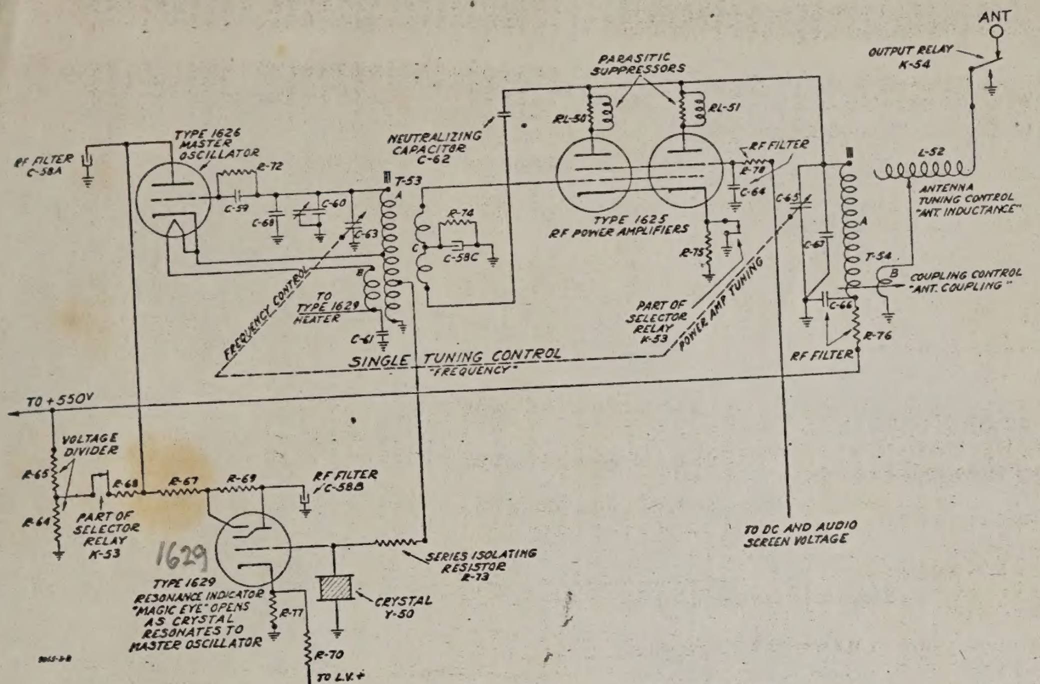


Fig. 17. Functional diagram of "Command" transmitter.

volts when this adjustment is completed. The transmitter is now ready for installation in the car.

80-Meter notes—

Either the *BC-696* (3.0-4.0 Mc.) or the *BC-457* (4.0-5.3 Mc.) transmitter may be used for 80-meter operation. The dial of the *BC-696* is directly calibrated for the 80-meter band, but this advantage is outweighed by the high surplus price of this unit. Actually, the *BC-457* is much better suited to 80-meter phone operation than is the *BC-696*. The *BC-457* will actually cover the top 60 kc of the 80-meter phone band (3940-4000 kc) without any adjustment of the padding condensers. The L/C ratio of the BC-457 is also much more nearly correct for amplitude modulation of the p-a stage than is the *BC-696*. The *BC-457* tunes the 80-meter phone band with almost 350 μμfd. of tank capacity, whereas the *BC-696* tunes the same range with only about 150 μμfd. of tank capacity. Under heavy modulation, the *BC-696* tends to splatter badly, due to insufficient "fly-wheel" effect in the p-a tank circuit.

The *BC-457* may be easily shifted to cover the complete 80 meter phone band by increasing the capacity of *C-67*, the p-a padding condenser, and *C-60*, the oscillator padding condenser. The slug adjustments of the oscillator and p-a coils should not be changed, as this would alter the tracking of the transmitter.

40-Meter notes—

Either the *BC-459* (7.0-9.1 Mc.) or the *BC-458* (5.3-7.0 Mc.) may be used for 40-meter operation. The L/C ratio in the p-a tank of either transmitter is satisfactory for phone operation. The conversion of the *BC-459* is exactly the same as described for the *BC-696* on 80-meters (*Figure 20*).

The *BC-458* modification is the same as that of the *BC-459*, with the addition of retuning the tank circuits to make the transmitter tune the 7.0-7.3 Mc. range.

The *BC-458* oscillator can easily reach 7.3 Mc. by decreasing the capacity of *C-60*, the oscillator padding condenser. However, this is a poor approach, since it degrades the high C/L ratio of the oscillator. It is best to remove the oscillator coil shield and remove 4 turns from the top end of the oscillator coil. Next, loosen the set screws holding the rotor shaft of *C-60*. Drill a ¼" hole in the side of the shield can so that the shaft can be turned when the shield is replaced. Remove two plates from the rotor of *C-63*, the oscillator tuning condenser. Flex the plates gently with a long-nosed pliers. If too much force is applied to the condenser, the rotor will jump out of its bearings, and the minute ball bearings will fall out of the joint. Remove two rotor plates in the same fashion from *C-65*, the p-a tuning condenser. Loosen the rotor lock on *C-67*, the p-a padding condenser. Finally, remove four turns from the top of the p-a coil, *T-54A*.

Plate voltage should be applied to the 6J5 oscillator, and *C-60* and the slug of *T-53* adjusted until 7.0 Mc. falls at 6.0 Mc. on the tuning dial, and 7.3 Mc. falls at 6.3 Mc. Thus the

Conversion Diagrams

R & M RADIO COMPANY

Radio Amateur and Industrial Electronic Supplies

1426 N. Quincy St. Arlington, Virginia

INTRODUCTION

The R & M Radio Co. since its inception has been deluged with requests for schematic diagrams covering various conversions of war surplus equipment and in view of the many requests, R & M put their engineers to work - hence this book.

It would be impossible for anyone to cover all phases of conversions and modifications possible. However, the basic ones are covered and being "Hams" at heart ourselves, we know that most Hams will go so far on any conversion or modification and then get ideas of their own and come up with something different and probably better.

Here is a good start and we are open to suggestions; and request your comments or questions.

R & M Radio Co.

The Editor

Newest conversion book—complete with schematic diagrams, instructions, and discussion—covers all these war surplus sets:

DIAGRAMS AND CONVERSION DATA ON . . .

- BC-348
- BC-375
- SCR-522
- SCR-274
- SCR-274—10 meter mobile

ALSO DIAGRAMS COVERING . . .

- BC-221 Freq. meter
- ART-13 Collins transmitter
- APN-1
- SCR-718
- APN-4

SCR-274-N

The SCR-274-N Command Set though originally designed to operate from a 27 VDC power source, can, with a new power supply, become one of the most useful pieces of gear to be found in the ham shack. For instance; the transmitters perform admirably as V.F.O.-Driver units for high power final RF amplifiers, or, by themselves as small, lightweight 50 watt transmitters. Pursuing the former thought, the SCR-274-N combined with the BC-375-E will provide the Ham with a high powered transmitter with VFO Driver unit and the 274-N receivers complete his station; further, the modulator unit has the audio driver stage necessary to put the wallop needed into the BC-375-E audio circuit and will make those big bottles of the BC-375-E get up and perform in a manner of which they are capable.

The receivers are superhets and due to the fine workmanship and parts in them will stand a lot of abuse. They are designed to operate with a wide variety of conditions and may be powered by vibrator, 110 AC-DC, dry cells or most any kind of power at hand. By rewiring the filament circuits for six volts and supplying plate power from a small vibropack no better portable communication receiver set would be desired.

Figure 1—Gives the necessary rack FT-220 wiring changes for the use of the receivers and suggests a simple power supply which may be built up on the rack itself.

Figure 2—Shows connections to be mede in changing adaptor FT-230 to FT-260.

Figure 3—Advances one of the many ways the modulator may be converted to use in conjunction with audio and RF driving power neccessary to develop the sock of which the BC-375-E is capable.

Figure 4—Is practical wiring diagram of the modulator with unused parts marked.

Figure 5—Shows transmitter filament wiring changes to operate with 12 vac filament power.

Figure 6—Is original overall schematic of modulator-transmitter.

Figure 7—Original receiver schematic.

RECEIVERS

When the 274-N receivers are used with an AC supply it is not necessary to make any changes in the receiver wiring provided the filament voltage supplied is 24 volts AC or DC. We considered the question and decided it was much simpler to dig up a 24 volt supply than to change the filament wiring of three receivers. Casting about the junk box we found a 6 volt center tapped filament transformer and decided it would make a nice auto transformer if we had 12 volts to put across one half of it. This could be had if we put the two filament windings of our power transmitter in series. We did this and we had our 24 volts. How it is done is shown in **Figure 1 274-N.** Next thoughts were for a regular step up auto transformer. We remember of by gone years when six volt tubes were plentiful but most transformers were equipped with 2½ volt filament windings. It was a neat trick then to take the core from an audio transformer and wind up another bobbin for it to step up 2½ volts to 6.3. This time we had a core of fair cross section so counting five turns per volt we put on 120 turns and took off a tap at 30 turns. With the power transformers 6.3 across the bottom and middle tap we got a nice 25 across the two outside terminals. This is also shown in **Figure 1.**

RECEIVER LOCAL CONTROL

The SCR-274-N Receivers BC-453-454-455 were designed for both remote and local control, but most are foudn equipped for remote control only. For local control and adaptor with on-off switch, CW or MCW, and volume control resistor incorporated with it are used. (These adaptors, known as FT-260-A are practically unobtainable). The adaptor fits into the front of the receiver panel and is held in position by four small screws. For remote control, adaptor FT-230 is used. This is only a plug with one connection on it and has no controls on its face. It may be used to make an adaptor similar to the FT-260. Loosen the four screws holding FT-230 and by pulling out the knob in the center of its panel, it will come out. Remove the two small screws holding the cover over the plug and slip off the cover. You will find the eight prong plug supported by two aluminum shafts which are swaged to the cover. Remove these shafts for they will be in the way of the controls, also remove the knob from the front of the adaptor. Take the back and control knobs off remote control BC-450 and take out the receiver on-off switch and radio control. These may now be mounted on the FT-230 panel and connected to the socket plug from this unit. Connections are shown in **Figure 2.** Use leads that are a couple inches longer than necessaryy to reach from the receiver panel to the plug prongs to enable us to push the socket wafer on the prongs before screwing the FT-230 panel on the receiver side.

THE MODULATOR

Modulator BC-456 contains the dynamotor and its relays, the audio system and voltage divider networks for the SCR-274-N transmitters. The dynamotor is very nicely designed and built and puts out an astounding amount of soup for its size but we shall forget it in this writing and assume it will never be used. The audio circuit is a beam type transmitting tube,1625, which has the carbon mike circuit directly to its grid and sans any amplifier stages ahead of it. This tube is used to suppressor grid modulate the pair of 1625's in the transmitter. There is the usual resistor-capacitor net work of voltage divider circuits and a VR-150 gas tube to stabilize and drop the screen voltage when the 274-N is on "voice".

Many service or war time audio circuits have only one tube doing service as an audio system. The explanation for this is simple. The carbon mike used carried more current than half the tubes could; 60 and sometimes 75 miles at 24 or less volts. With this sort of zip the mike, voltage stages are not necessary but we are dealing with civilian mikes that have not that sort of output so we must add a stage of audio in our modulator. This easy for there is a tube labeled V-50 in **Figure 3, 274-N.** This is equivalent of a 6-J-5. To some the idea of starting the infinite trickle of voltage from a crystal mike to a triode and then putting it to a high gain beam tube may sound a little backwards but it works out very nicely. First thing to do is start removing a few odds and ends that won't be necessary anymore. Refer to the Modulator Practical wiring diagram **Figure 4** to locate these parts for we have drawn diagonal lines through those not needed.

Namely, these will be three relays K-50, K-51 and K-52 (two of these are on top, under the tube cover), RF Choke L-150, mike transformer T-51, tone oscillator T-50.

Snip all the leads from J-54 for we won't need that plug at all and it will help clear the way under the chassis.

Where T-50 and T-51 come out there will now be room for mike jacks, gain controls and switches.

Now the **Figure 3 and Figure 4** we can re-wire the modulator and take off from there to the few changes in the transmitters.

TRANSMITTER

The 274-N transmitters, when used as VFO, require very little change in wiring and this is in the filament circuits only. **Figure 5** gives these changes. These transmitters are so arranged that the crystal is not an integral part of the oscillator but is used instead to check the accuracy of same. For service use it was sufficient to check on one dial point only and assume the rest of the range correct enough. This would hardly do for civilian use but may be improved on by using crystals to check and confine the settings to proper bounds, for instance, two crystals may be used to mark the higher and lower band edges and thus assure the user of not trespassing on adjacent spectrums, or the user may wish a spot frequency and plug in the correct crystal, tune to resonance as usual just as though the circuit functioned as a crystal oscillator. The tuning procedure is simple to the extreme for it is only necessary to lift the rear tube cover, insert the crystal, leave the cover opened at an angle that will enable the ray tube glow to be seen in the little mirror riveted to the top, and tune the transmitter until the shadow angle of the tube is greatest. As the oscillator and power amplifier are ganged together this is all the tuning necessary other than to observe if tuning the antenna loading circuit has any effect on the frequency. Care must be taken in loading as is the case in all VFO's.

Dial calibration may be lined up to the proper frequency by inserting a small insulated screw driver through the hole in the top back portion of the transmitter that is covered by a snap slide. This will reach a small trimmer condensor in the oscillator circuit.

For ease in tuning to any crystal it is suggested that a small meter be put either in the cathode or plate circuit of the target tube and mounted on the transmitter where it may be easily seen. This will make any appreciable drift immediately apparent, however, the variation is small and some circuit modification base. This may necessitate an adaptor to allow the crystal holders usually found in the shack to be used in the set although there are several types on the market that can be plugged into an octal socket.

The final amplifier is coupled to the antenna loading circuit by a variable coupling loop that is fastened to a shaft within the final plate tank if it is desired, this loop may be utilized to connect to a low impedance line and well serve to carry the output to an antenna or power amplifier.

The loading coil may be used to resonate a random length wire antenna or may be tuned by the addition of an other condensor and coupled directly to the grid of a following amplifier.

Still another thought is to remove the antenna tuner coil and substitute the usual plug-in coil and condenser. The later would probably be the most efficient if the user contemplated doubling in the following stage for much loss would result in the shorted turns of the antenna coil.

When the transmitter is to be used without the following stage it would be handy to install a co-ax connector in the panel face to enable the user to couple to low impedance feeders such as center fed antennas sometimes use.

Figure 5 gives the necessary detail for wiring changes for 274-N transmitters for operation from 12 volt AC filament supplies.

TUNING BY CALIBRATIN CRYSTAL

In order to test the theory that more than one crystal could be used in parallel in place of the one supplied. It was decided to put six crystal in the place of the one.

For testing purposes an adaptor was made up from a thin bakelite strip 1¼" wide. This was mounted vertically from the center of an octal tube base. Tube prong jacks removed from six prong tube sockets were mounted on the strip to allow three crysals to be mounted on each side. The six crystals were ganged in parallel in place of the single original rock and were separated in frequency by 10 kc. In the set-up there was found no interaction, the adjacent channels were easy to locate by the target tube shadow. By careful tuning, the frequency was plus or minus 100 cps, the crystal ferquency, with ease. By tuning within the range of the target tube shadow movement the frequency could be varied 500 to 2,000 CPS depending on the transmitter used. The same condition existed for any frequency covered by the transmitter dial markings. The dials are marked off in 10 kc steps and are driven by a reduction gear from the small knob in lower right hand of the panel. By removing the knob and fixing a small disc to it which had been marked off in 20 divisions we have a vernier control. One-fifth revolution of the vernier covers about 10 kc on the main dial of the 7-9 mc transmitter and one-third revolution on the 3-4 mc.

A Word About The Stability Of SCR-274-N Transmitters

When modulated by the original screen grid method the frequency is apt to swing a good many hundred cycles if the final is too heavily loaded. Completely removing the load from the final and replacing it will cause a frequency drift of roughly 5,000 cycles.

For perfect operation a VR tube, stabilized oscillator plate voltage or some similar arrangement would be necessary. The original circuit has a VR tube in the final amplifier screen grid circuit which is used to drop and stabilize the screen voltage of the final to allow modulation via that grid. As the oscillator operates at 250 volts plate and the small amount of frequency variation noticed was caused by voltage drop along the divider resistor network of the modulator, perhaps it would be easier to supply the oscillator plate voltage from a nearby receiver or separate small supply. As it stands the variation is not objectionable if properly handled.

In the transmitter schematic there will be noticed R-77 and R-70 of the resonance indicator which form the cathode resistors of this tube. With these two resistors for forming the target bias the indication is small at the resonance peak and difficult to see in a bright light. R-70 originally placed a positive voltage upon the cathode from the 27 VDC to provide constant biasing of the tube. With AC on the filaments is should be removed and as R-70 is the right value should be put in place of the cathode resistor R-77. This will greatly improve the target shadow swing and facilitate tuning.

One method tried works nicely for controlling the transmitters. The relays were removed and rewound by filling the bobbins with 24DCC wire. This allowed them to be operated by a small three volt battery pack.

For mobile use many of the gang and also several branches of the government service have used the familiar PE-103 dynamotor to power the 274-N transmitter and modulator. PE-103 has a 12 or 6 volt input and 500 volts at 160 mills. By feeding 6 volts into the dynamotor, 12 volts and 500 may be taken out. By re-wiring the filament circuits and the relays for 12 volts plus a lower value of resistance in the mike supply circuit the equipment may be used exactly as it was in the aircraft.

For crystal control a clever scheme has come to our

attention. In the original circuit the oscillator grid leak and capacitator are in series with the grid. By changing the grid leak position so that it will go from grid to ground and placing the grid capacitator in a crystal holder, crystals may be placed in series with the grid circuit. This in effect forms a crystal filter and will not permit the circuit to function at any frequency but that of the crystal. By removing the crystal and replacing the condensor the circuit is again a VFO.

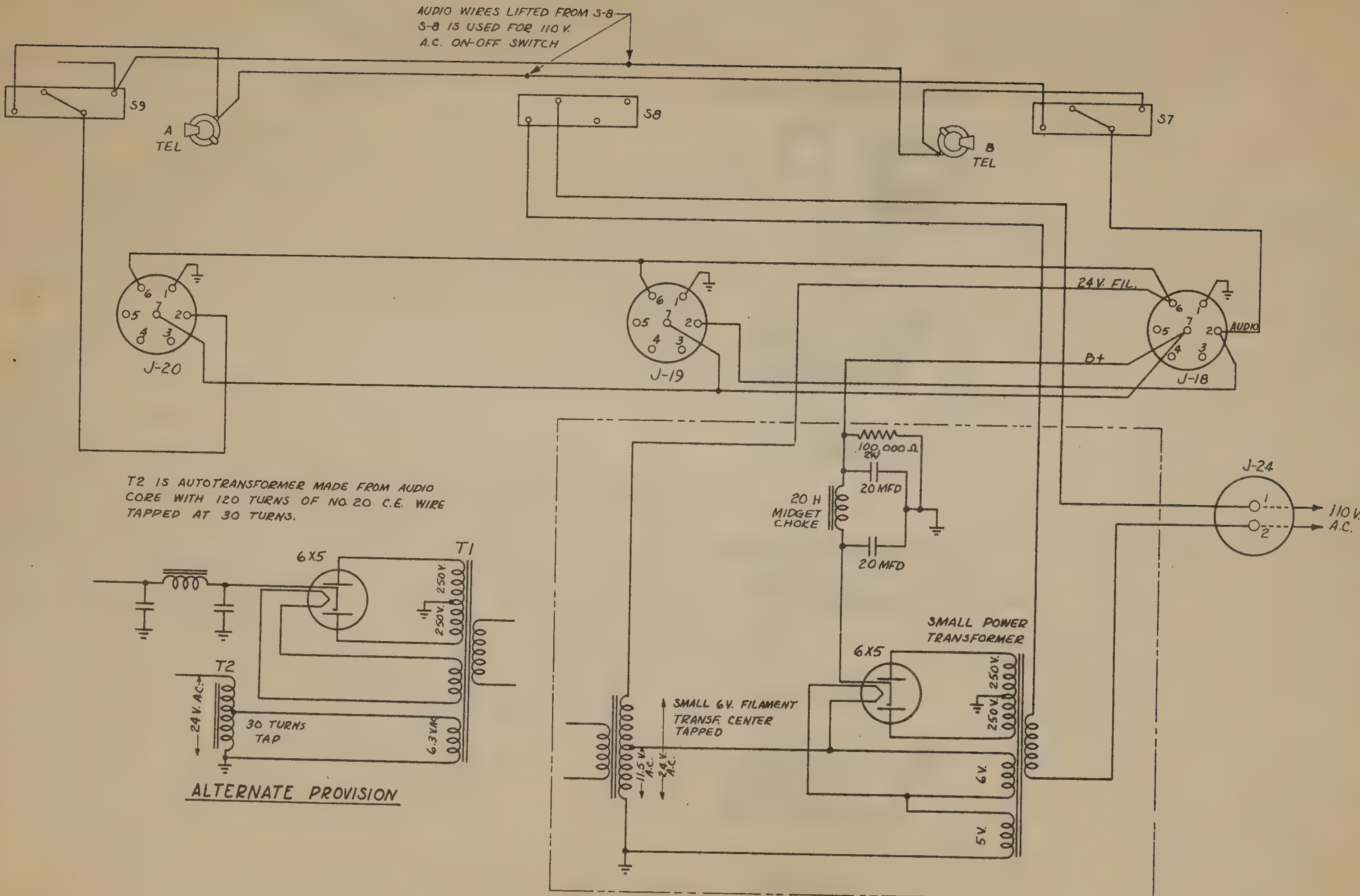
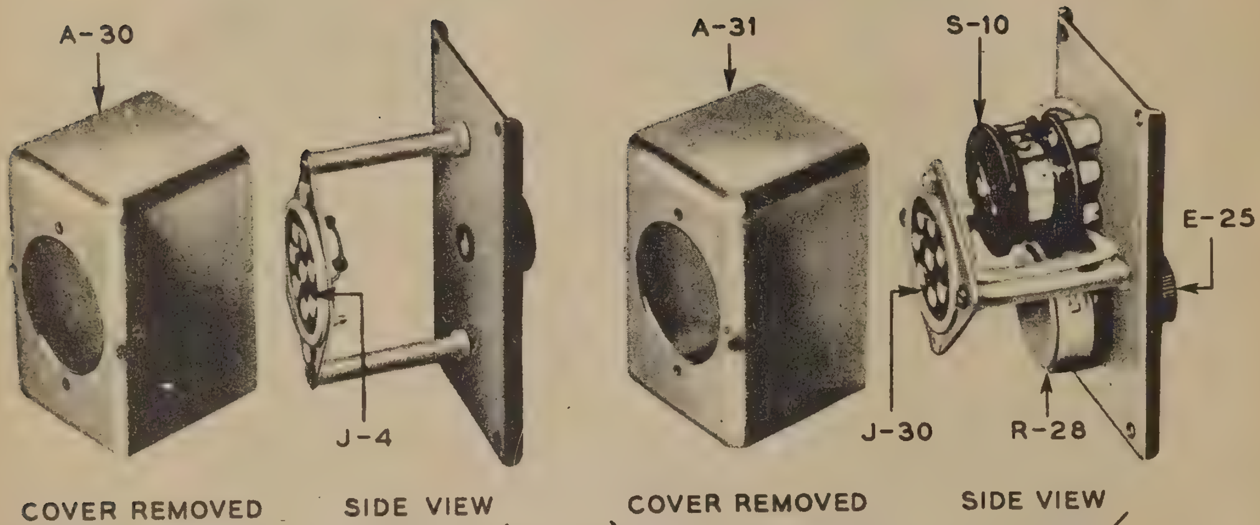


FIGURE 1—274N



ADAPTER FT-230-A FIG.2-274 ADAPTER FT-260-A

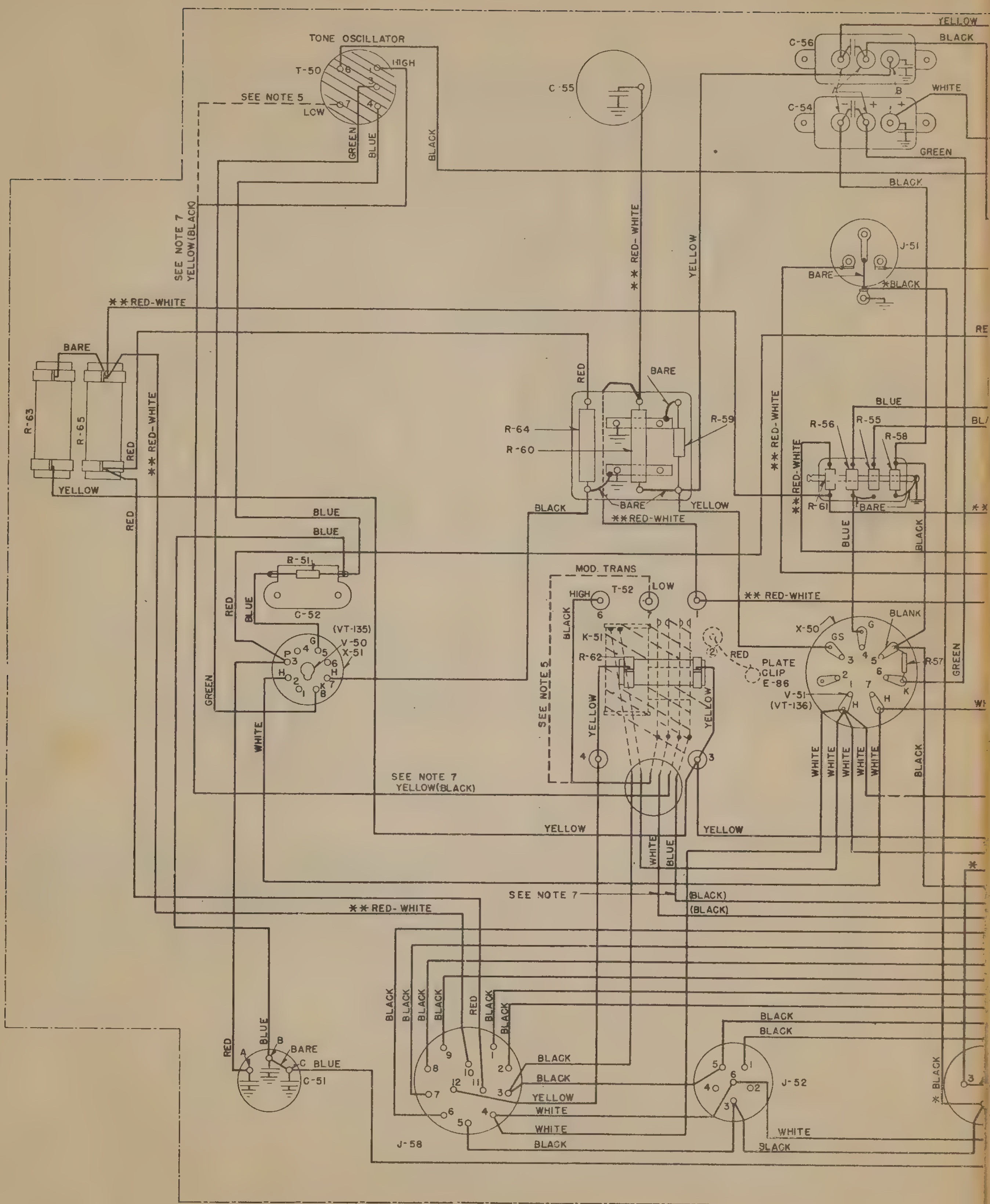
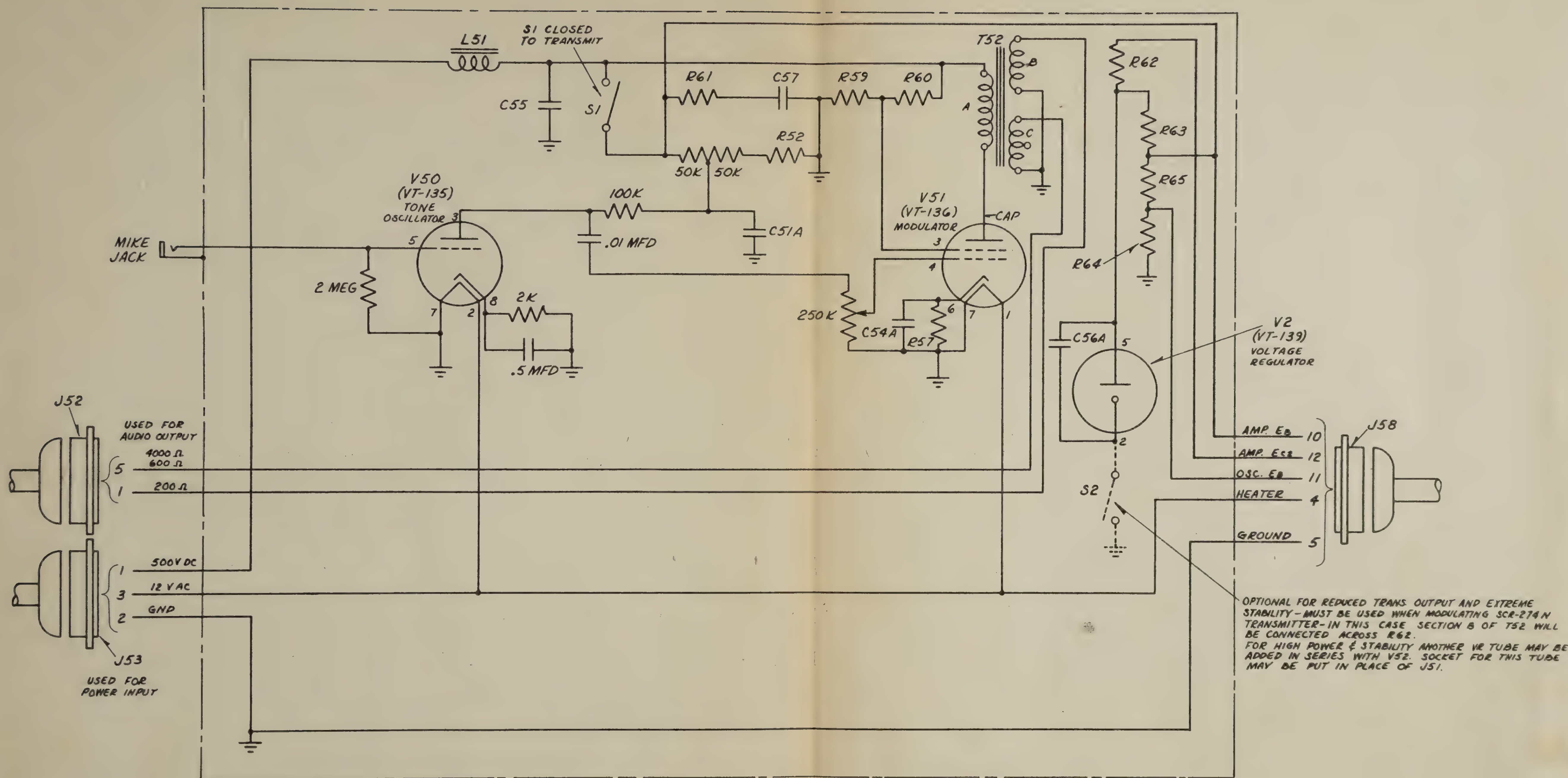
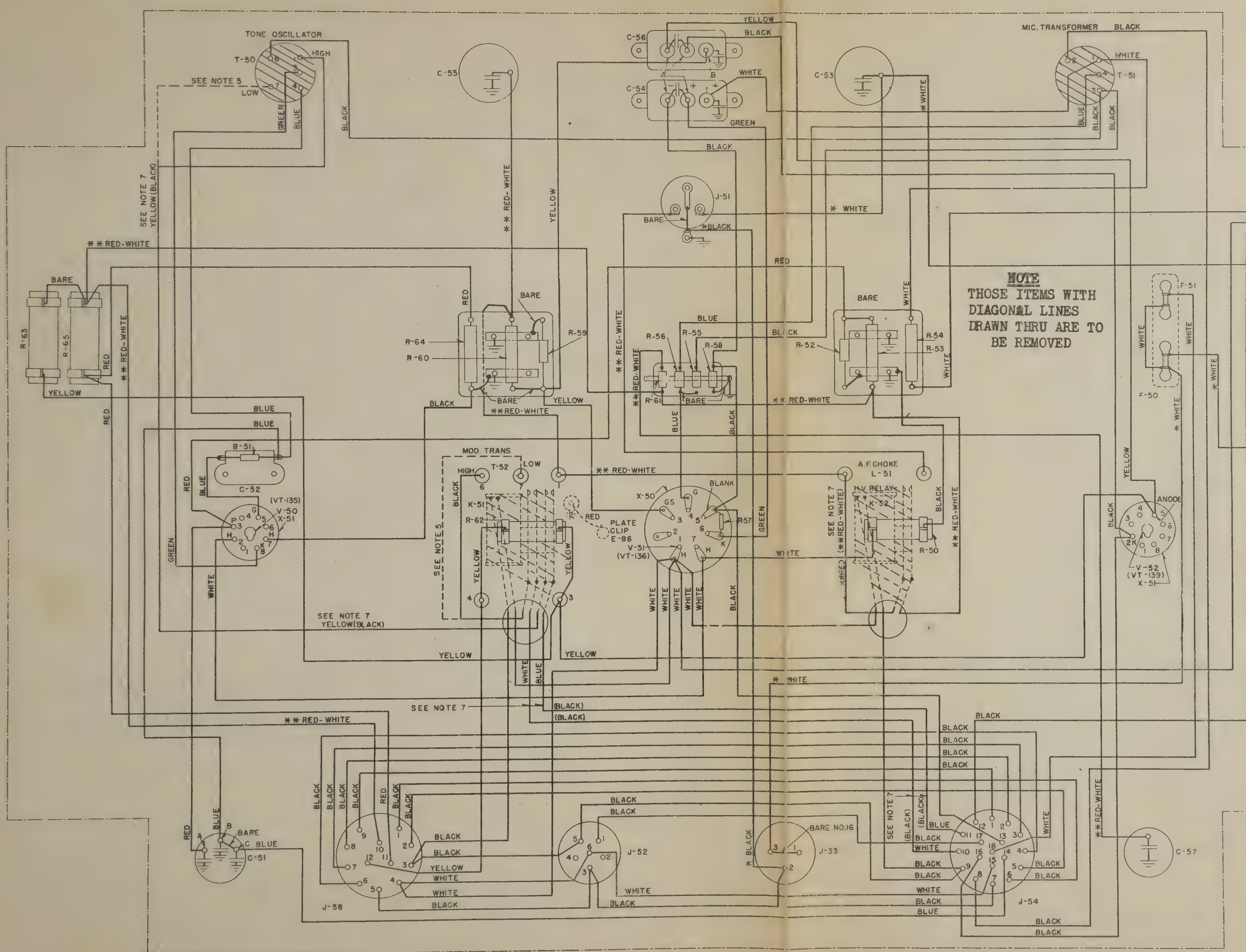


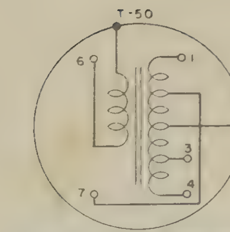
FIGURE 4-274N



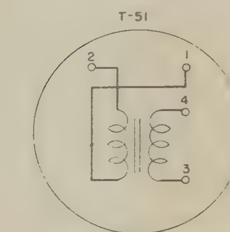
L51
S1 CLOSED TO TRANSMIT
C55
S1
R61
C57
R59
R60
T52
B
A
C
R52
50K 50K
V50 (VT-135) TONE OSCILLATOR
100K
C51A
.01 MFD
MIKE JACK
2 MEG
2K
.5 MFD
V51 (VT-136) MODULATOR
CAP
250K
C54A
R57
R62
R63
R65
R64
C56A
V2 (VT-139) VOLTAGE REGULATOR
S2
J52
USED FOR AUDIO OUTPUT
4000 Ω
600 Ω
200 Ω
500V DC
12 V AC
GND
J53
USED FOR POWER INPUT
J58
AMP. E_B 10
AMP. E_{S2} 12
OSC. E_B 11
HEATER 4
GROUND 5
OPTIONAL FOR REDUCED TRANS. OUTPUT AND EXTREME STABILITY - MUST BE USED WHEN MODULATING SCR-274 N TRANSMITTER - IN THIS CASE SECTION B OF T52 WILL BE CONNECTED ACROSS R62.
FOR HIGH POWER & STABILITY ANOTHER VR TUBE MAY BE ADDED IN SERIES WITH V52. SOCKET FOR THIS TUBE MAY BE PUT IN PLACE OF J51.

Fig 3-274-N

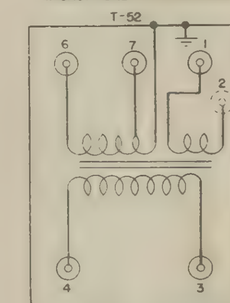




TONE OSCILLATOR TRANSFORMER.
TAP 7 IS PROVIDED IN BC-456-B ONLY
SEE NOTE 5



MICROPHONE TRANSFORMER

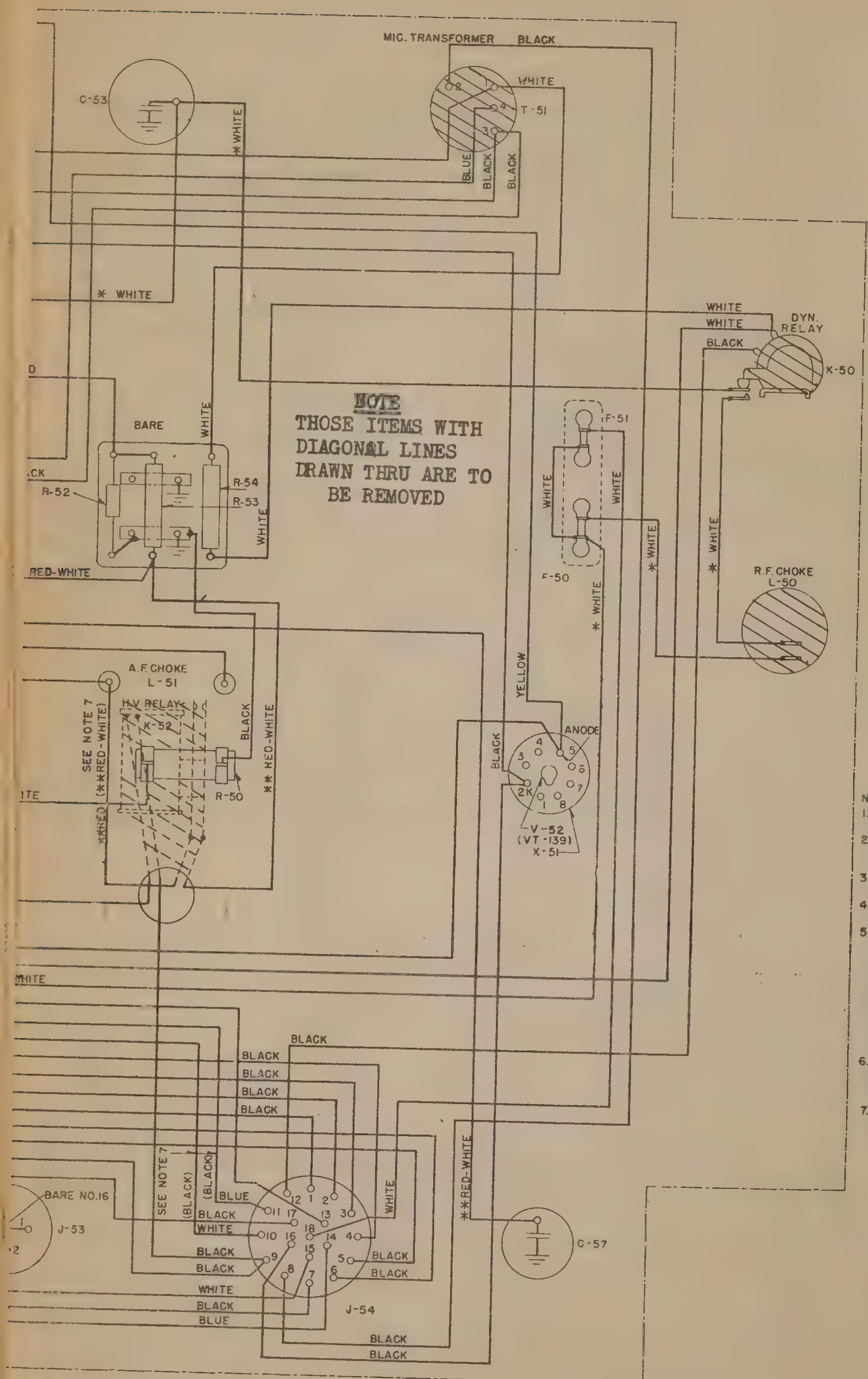


MODULATION TRANSFORMER
TAP 7 PROVIDED IN BC-456-B ONLY
SEE NOTE 5

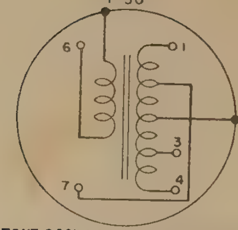
NOTES:

1. ALL WIRES MARKED (*) TO BE NO.18 STRANDED COPPER.
2. ALL WIRES MARKED (**) TO BE NO.22 SINGLE CONDUCTOR TINNED COPPER, HEAVY INSULATION.
3. ALL BARE WIRES ARE NO.22 TINNED COPPER EXCEPT AS NOTED.
4. ALL OTHER INSULATED WIRES TO BE NO.22 SOLID COPPER.
5. MODULATOR UNIT BC-456-B IS EQUIPPED WITH TRANSFORMERS DESIGNATED "MOD. TRANS." AND "TONE OSCILLATOR" EACH OF WHICH INCLUDES TAP 7 FOR MAKING A LOW IMPEDANCE HEADSET CONNECTION BC-456-B MODULATOR UNITS AS SUPPLIED ARE WIRED FOR THE HIGH IMPEDANCE CONNECTION. CHANGES IN THE WIRING FROM TAP 1 TO TAP 7 ON TONE OSCILLATOR AND FROM TAP 6 TO TAP 7 ON MOD. TRANS. AS INDICATED ARE REQUIRED FOR THE LOW IMPEDANCE HEADSET CONNECTION.
6. TERMINAL NUMBERS AND LETTERS AT TUBE SOCKETS AND MOD. TRANS. ARE FOR REFERENCE PURPOSES AND DO NOT APPEAR ON APPARATUS.
7. WIRE COLORS SHOWN IN PARENTHESIS ARE USED IN MODULATOR UNITS BC-456-A AND IN EARLY PRODUCTION UNITS BC-456-B.

FIGURE 4-274N

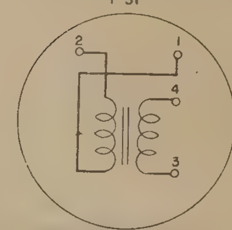


T-50



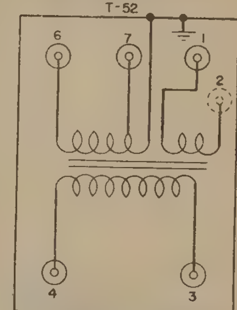
TONE OSCILLATOR TRANSFORMER.
TAP 7 IS PROVIDED IN BC-456-B ONLY
SEE NOTE 5

T-51



MICROPHONE TRANSFORMER

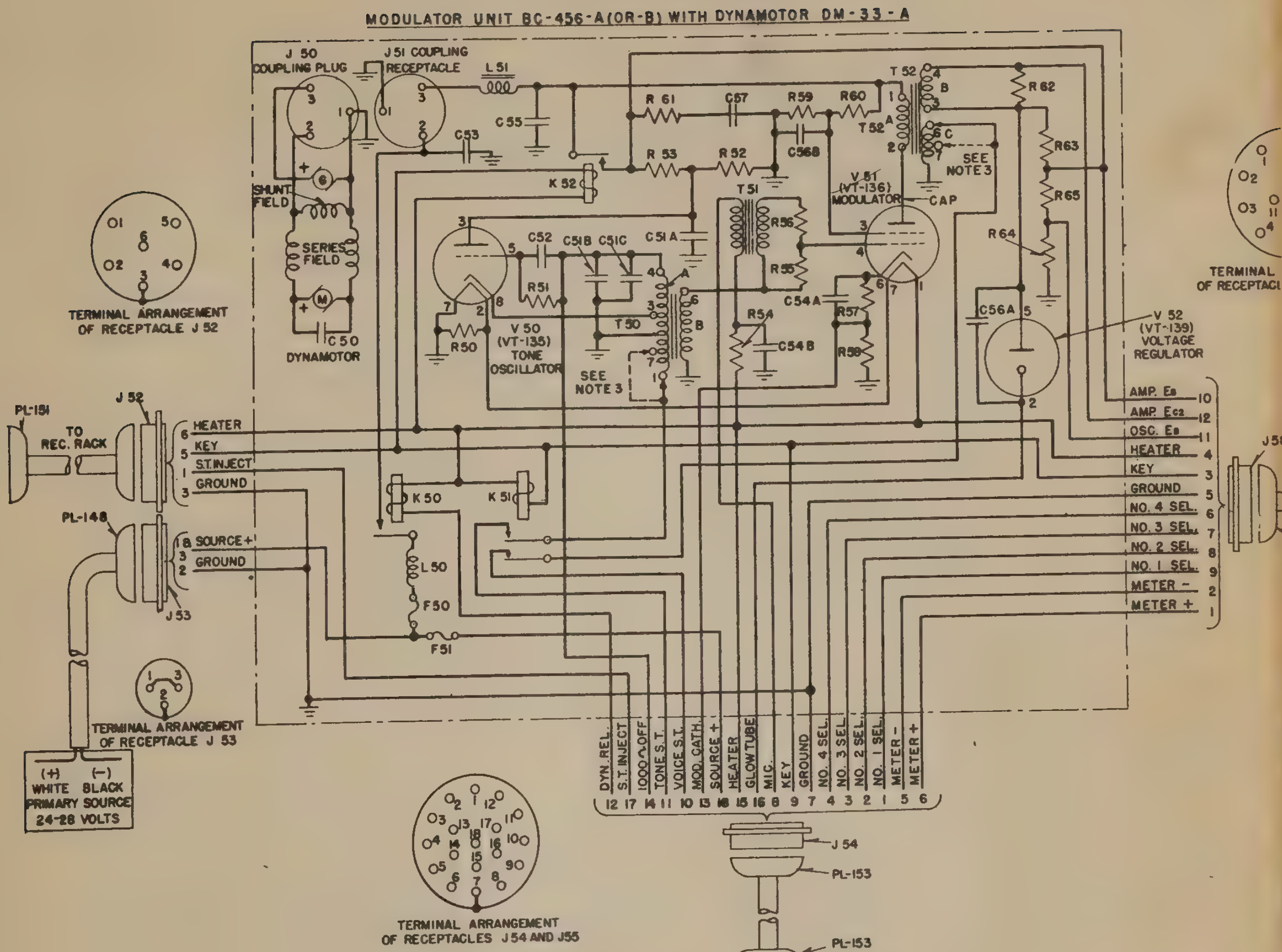
T-52

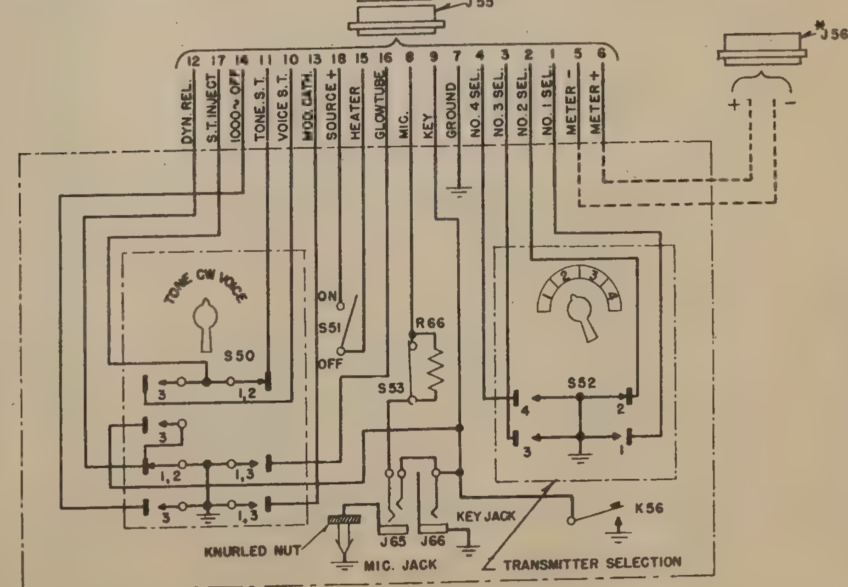


MODULATION TRANSFORMER
TAP 7 PROVIDED IN BC-456-B ONLY
SEE NOTE 5

NOTES:

1. ALL WIRES MARKED (*) TO BE NO.18 STRANDED COPPER.
2. ALL WIRES MARKED (**) TO BE NO.22 SINGLE CONDUCTOR TINNED COPPER, HEAVY INSULATION.
3. ALL BARE WIRES ARE NO.22 TINNED COPPER EXCEPT AS NOTED.
4. ALL OTHER INSULATED WIRES TO BE NO.22 SOLID COPPER.
5. MODULATOR UNIT BC-456-B IS EQUIPPED WITH TRANSFORMERS DESIGNATED "MOD. TRANS." AND "TONE OSCILLATOR" EACH OF WHICH INCLUDES TAP 7 FOR MAKING A LOW IMPEDANCE HEADSET CONNECTION. BC-456-B MODULATOR UNITS AS SUPPLIED ARE WIRED FOR THE HIGH IMPEDANCE CONNECTION. CHANGES IN THE WIRING FROM TAP 1 TO TAP 7 ON TONE OSCILLATOR AND FROM TAP 6 TO TAP 7 ON MOD. TRANS. AS INDICATED ARE REQUIRED FOR THE LOW IMPEDANCE HEADSET CONNECTION.
6. TERMINAL NUMBERS AND LETTERS AT TUBE SOCKETS AND MOD. TRANS. ARE FOR REFERENCE PURPOSES AND DO NOT APPEAR ON APPARATUS.
7. WIRE COLORS SHOWN IN PARENTHESIS ARE USED IN MODULATOR UNITS BC-456-A AND IN EARLY PRODUCTION UNITS BC-456-B.





NOTES ON SWITCHES S 50, S 52 AND S 53

THE NUMBERS ON THE VARIOUS CONTACTS REFER TO THE POSITIONS OF THE SWITCH LEVERS AT WHICH THESE PARTICULAR CONTACTS ARE CLOSED BY THE ACTION OF THE SWITCH. ON S 50, "TONE" IS 1, "CW" IS 2, AND "VOICE" IS 3.

S 53 SHOULD ALWAYS BE KEPT IN "R OUT" POSITION AS INDICATED ON THE RED PLATE FOR SATISFACTORY OPERATION WITH MICROPHONE T 17, T 30 OR EQUAL.

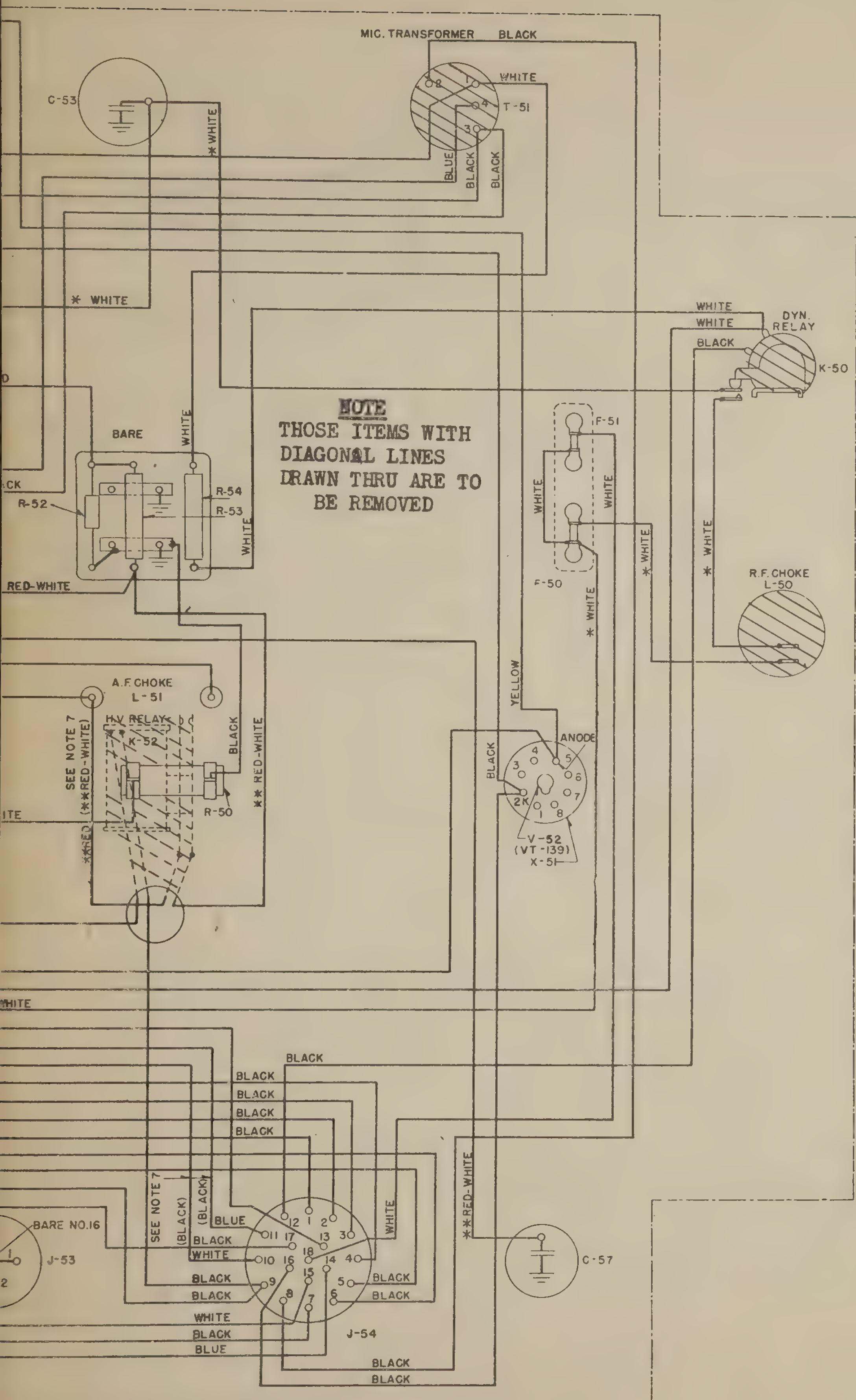
NOTE ON MICROPHONE JACK J 65

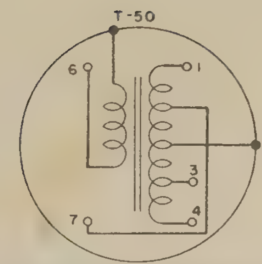
THE KNURLED NUT IS USED TO GROUND THE SLEEVE OF JACK J 65 WHEN A MICROPHONE EQUIPPED WITH A PUSH-TO-TALK SWITCH, SUCH AS MICROPHONE T 17, IS USED. WHEN THE JACK SLEEVE IS NOT GROUNDED, THE PUSH-TO-TALK FUNCTION MUST BE PERFORMED BY KEY K 56 OR AN EXTERNAL KEY OR SWITCH CONNECTED TO JACK J 66.

RADIO CONTROL BOX
BC-451-A

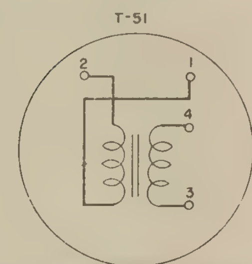
CAPA
SYMBOL
C 50
C 51 (A,B,C)
C 52
C 53
C 54 (A,B)
C 55
C 56 (A,B)
C 57
C 58 (A,B,C)
C 59
C 60
C 61
C 62
C 63
C 64
C 65
C 66
C 67
C 68
C 69

FIGURE 6-

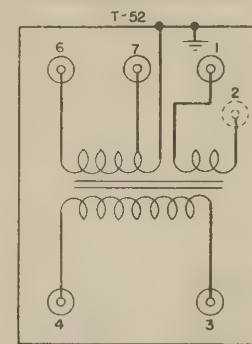




TONE OSCILLATOR TRANSFORMER.
TAP 7 IS PROVIDED IN BC-456-B ONLY
SEE NOTE 5



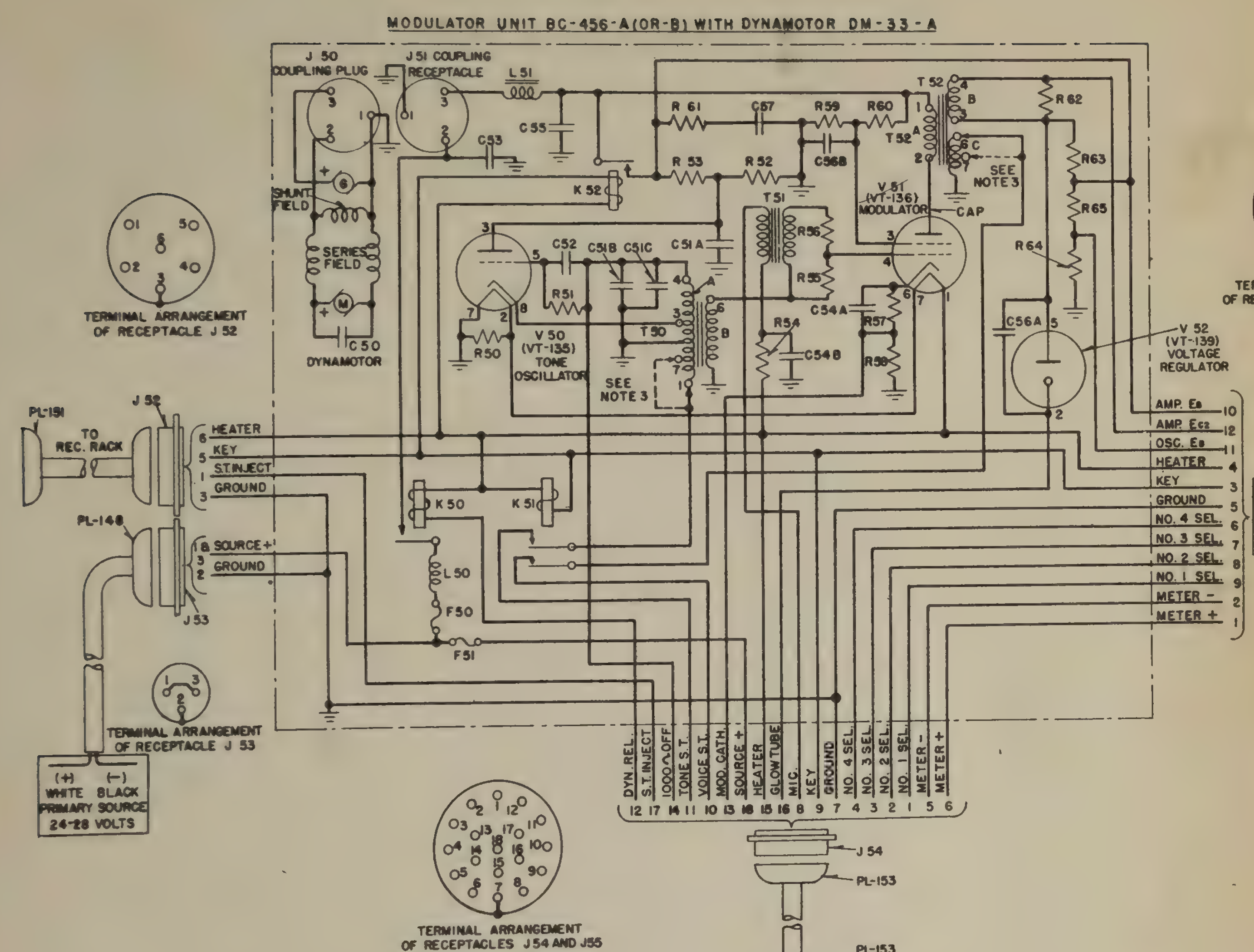
MICROPHONE TRANSFORMER

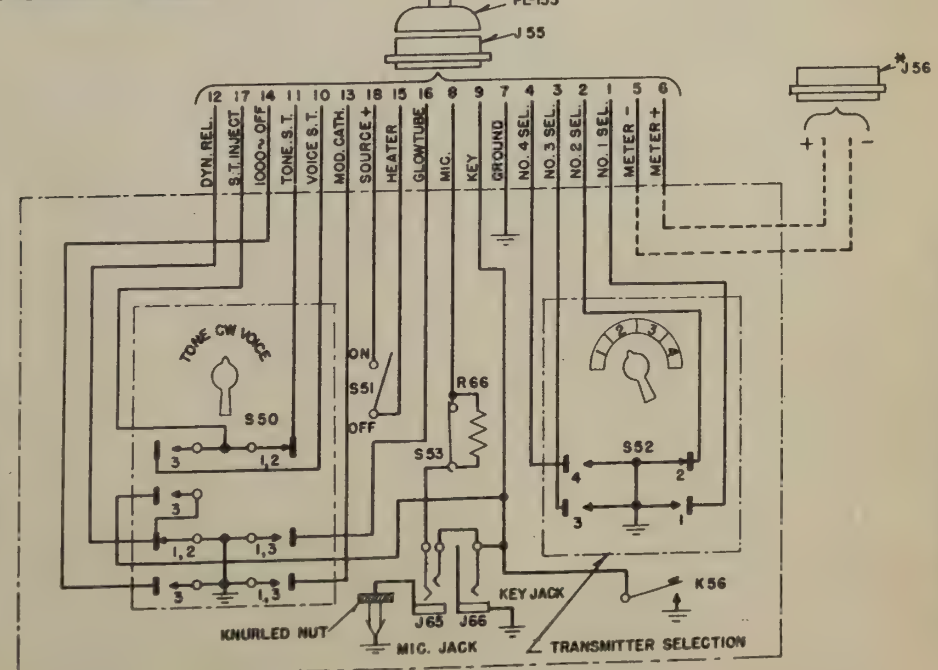


MODULATION TRANSFORMER
TAP 7 PROVIDED IN BC-456-B ONLY
SEE NOTE 5

NOTES:

1. ALL WIRES MARKED (*) TO BE NO.18 STRANDED COPPER.
2. ALL WIRES MARKED (**) TO BE NO.22 SINGLE CONDUCTOR TINNED COPPER, HEAVY INSULATION.
3. ALL BARE WIRES ARE NO.22 TINNED COPPER EXCEPT AS NOTED.
4. ALL OTHER INSULATED WIRES TO BE NO.22 SOLID COPPER.
5. MODULATOR UNIT BC-456-B IS EQUIPPED WITH TRANSFORMERS DESIGNATED "MOD. TRANS." AND "TONE OSCILLATOR" EACH OF WHICH INCLUDES TAP 7 FOR MAKING A LOW IMPEDANCE HEADSET CONNECTION. BC-456-B MODULATOR UNITS AS SUPPLIED ARE WIRED FOR THE HIGH IMPEDANCE CONNECTION. CHANGES IN THE WIRING FROM TAP 1 TO TAP 7 ON TONE OSCILLATOR AND FROM TAP 6 TO TAP 7 ON MOD. TRANS. AS INDICATED ARE REQUIRED FOR THE LOW IMPEDANCE HEADSET CONNECTION.
6. TERMINAL NUMBERS AND LETTERS AT TUBE SOCKETS AND MOD. TRANS. ARE FOR REFERENCE PURPOSES AND DO NOT APPEAR ON APPARATUS.
7. WIRE COLORS SHOWN IN PARENTHESIS ARE USED IN MODULATOR UNITS BC-456-A AND IN EARLY PRODUCTION UNITS BC-456-B.





NOTES ON SWITCHES S 50, S 52 AND S 53

THE NUMBERS ON THE VARIOUS CONTACTS REFER TO THE POSITIONS OF THE SWITCH LEVERS AT WHICH THESE PARTICULAR CONTACTS ARE CLOSED BY THE ACTION OF THE SWITCH. ON S 50, "TONE" IS 1, "CW" IS 2, AND "VOICE" IS 3.

S 53 SHOULD ALWAYS BE KEPT IN "R OUT" POSITION AS INDICATED ON THE RED PLATE FOR SATISFACTORY OPERATION WITH MICROPHONE T 17, T 30 OR EQUAL.

NOTE ON MICROPHONE JACK J 65

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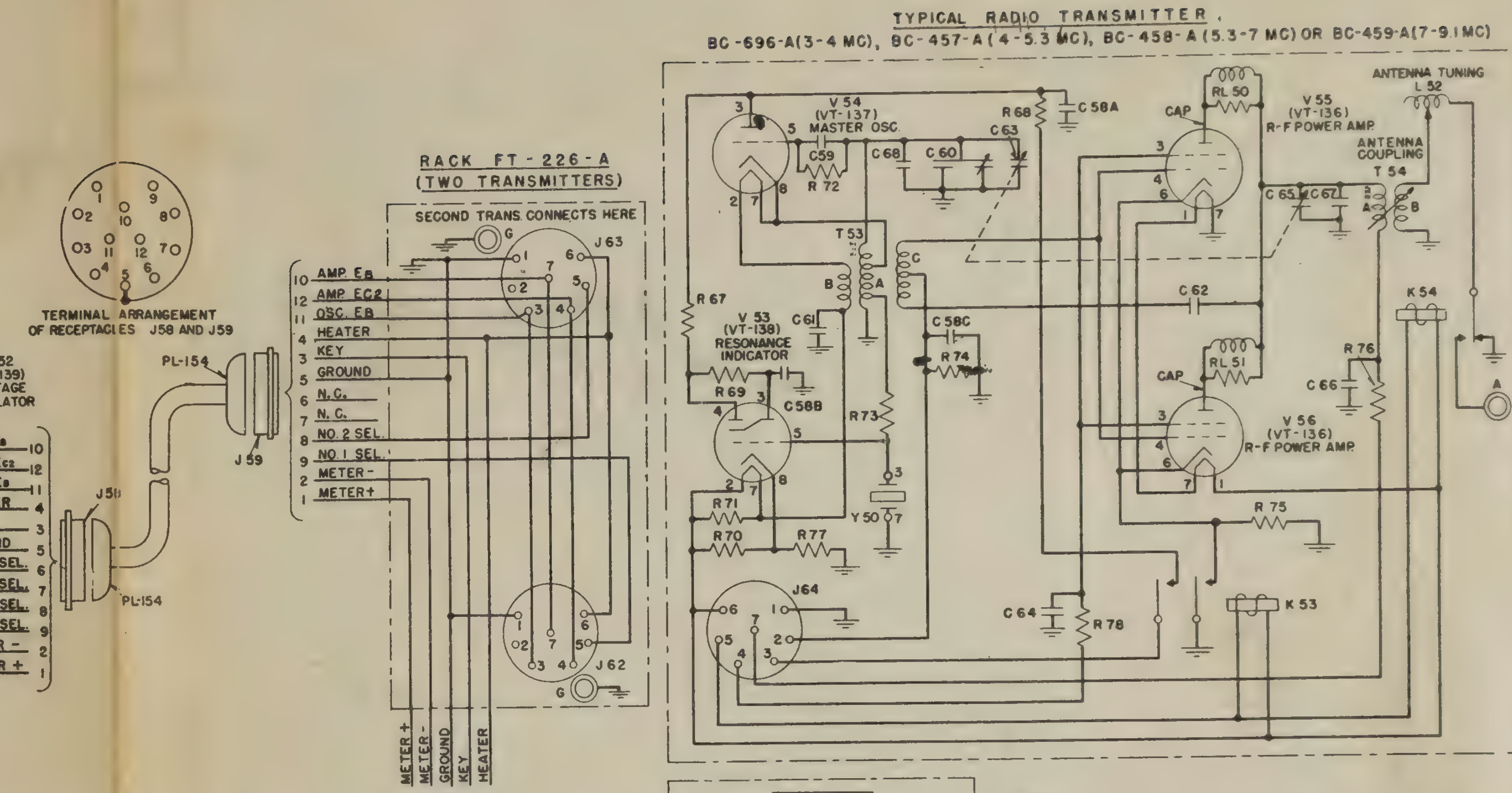
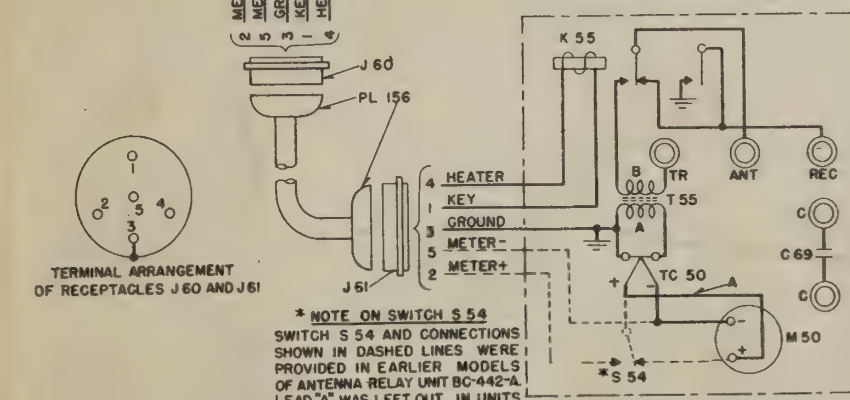
RADIO CONTROL BOX
BC-451-A





* NOTE ON SWITCH S 54

SWITCH S 54 AND CONNECTIONS SHOWN IN DASHED LINES WERE PROVIDED IN EARLIER MODELS OF ANTENNA RELAY UNIT BC-442-A. LEAD "A" WAS LEFT OUT IN UNITS WHERE S 54 WAS USED.

ANTENNA RELAY UNIT
BC-442-A OR
ANTENNA RELAY UNIT BC-442-AM
(LESS C-69 AND BINDING POSTS "C")

NOTES

1. ALL RELAYS ARE SHOWN IN THE NON-ENERGIZED POSITION.
2. ALL COUPLING PLUGS AND RECEPTACLES SHOWN AS VIEWED FROM THE OUTSIDE. ALL PLUGS AS VIEWED FROM THE CORDAGE END HAVE THE SAME ORIENTATION OF CONDUCTORS AS THAT SHOWN HERE FOR THEIR RESPECTIVE RECEPTACLES.
3. TRANSFORMERS T 50 AND T 52 IN MODULATOR UNIT BC-456-B ARE PROVIDED WITH SIDETONE TAPS FOR LOW IMPEDANCE HEADSETS (7 ON T 50 AND 7 ON T 52). MODULATOR UNITS BC-456-A AND BC-456-B ARE NORMALLY FURNISHED WITH CONNECTIONS SHOWN IN SOLID LINES FOR USE WITH HIGH IMPEDANCE (8000 OHMS) HEADSETS. MODULATOR UNIT BC-456-B CAN BE CHANGED FOR USE WITH LOW IMPEDANCE (600 OHMS) HEADSETS BY SUBSTITUTING CONNECTIONS SHOWN IN DASHED LINES.
4. TERMINAL NUMBERS APPEARING ON RECEPTACLES OF JACK J 51 IN MODULATOR UNIT AND J 64 IN TRANSMITTER AND ALL CIRCUIT SYMBOLS ARE FOR REFERENCE PURPOSES ONLY. THEY DO NOT APPEAR ON THE EQUIPMENT.
5. * DISCONTINUED ON LATER EQUIPMENTS.

CAPACITORS	
SYMBOL	MICROFARADS
C 50	.006
C 51 (A,B,C)	.05/.05/.05
C 52	.006
C 53	1.2
C 54 (A,B)	5/20.
C 55	1.2
C 56 (A,B)	.5/.5
C 57	.05
C 58 (A,B,C)	.05/.05/.05
C 59	.00018
C 60	MO. PADDING
C 61	.006
C 62	FIXED NEUTR.
C 63	MO. TUNING
C 64	.002
C 65	PA. TUNING
C 66	.01
C 67	PA. PADDING
C 68	.000003
C 69	.00005

INDUCTORS	
SYMBOL	DESCRIPTION
L 50	RF CHOKE APPR. 15 MICROHENRIES
L 51	1.7 HENRIES
L 52	ANT. TUNING INDUCTOR

RELAYS & KEYS	
SYMBOL	DESCRIPTION
K 50	DYNAMOTOR INPUT
K 51	SIDETONE, VOICE AND TONE
K 52	DYNAMOTOR HIGH VOLTAGE (KEYING)
K 53	TRANSMITTER SELECTOR
K 54	TRANSMITTER OUTPUT
K 55	ANTENNA SWITCHING REC. TO TRANS.
K 56	BUILT-IN KEY

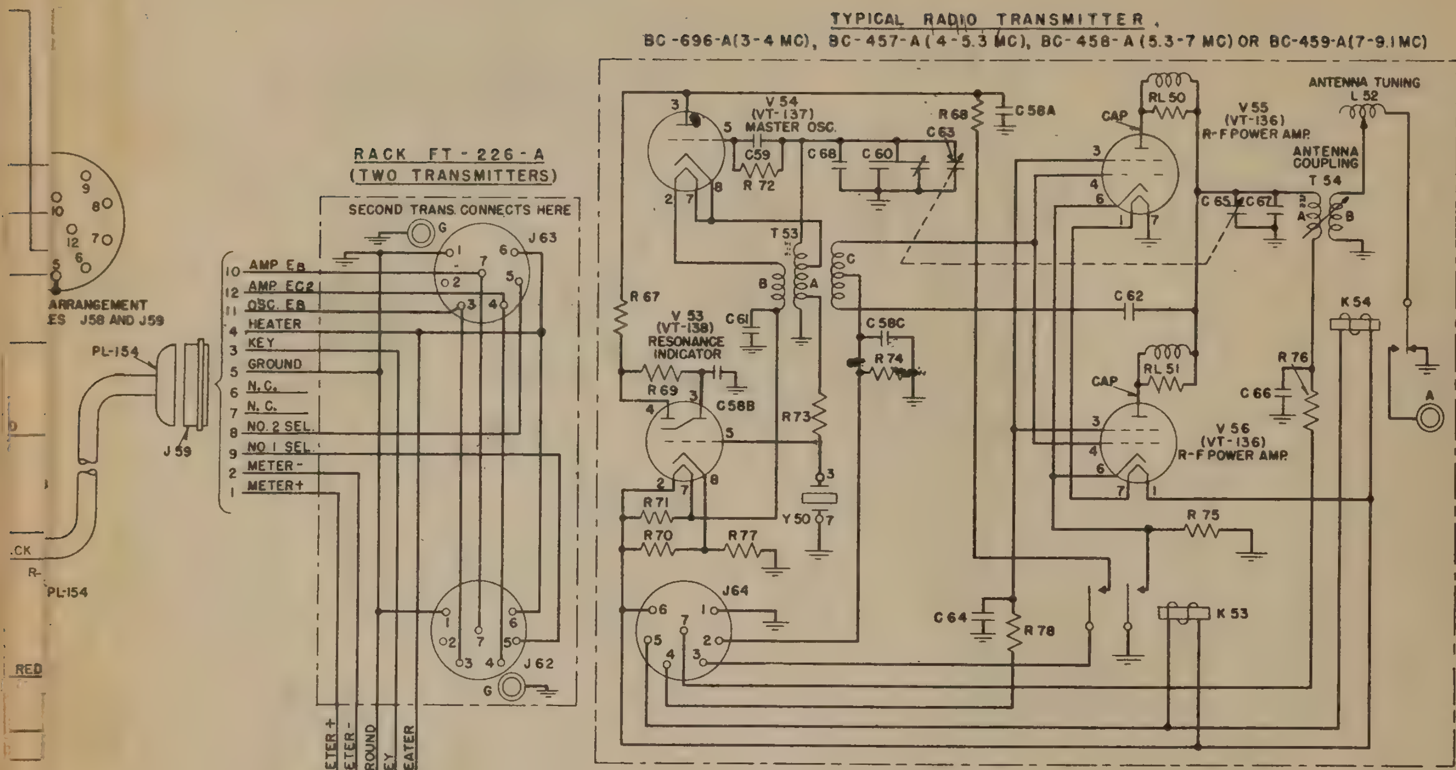
RESISTORS			
SYMBOL	OHMS	SYMBOL	OHMS
R 50	42	R 70	1000 FOR BC-457-A
R 51	100,000	R 70	1000 FOR BC-458-A
R 52	300,000	R 70	1500 FOR BC-459-A
R 53	91,000	R 70	1500 FOR BC-696-A
R 54	360	R 71	126
R 55	2000	R 72	51,000
R 56	1300	R 73	10,000 FOR BC-457-A
R 57	390	R 73	15,000 FOR BC-458-A
R 58	51,000	R 73	5100 FOR BC-459-A
R 59	30,000	R 73	5100 FOR BC-696-A
R 60	75,000	R 74	15,000
R 61	20	R 75	51,000
R 62	10,000	R 76	20
R 63	20,000	R 77	390
R 64	100,000	R 78	51
R 65	15,000		
R 66	510		
R 67	51,000		
R 68	20		
R 69	1,000,000		

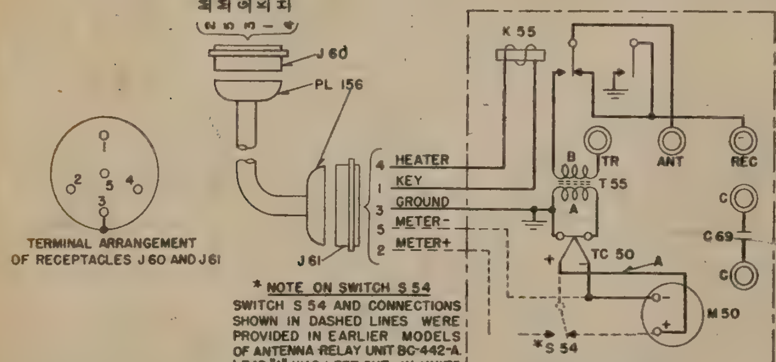
SWITCHES	
SYMBOL	DESCRIPTION
S 50	CHOICE OF EMISSION
S 51	MAIN "ON-OFF" BATTERY LINE
S 52	TRANSMITTER SELECTION
S 53	SHUNTS MIC. SERIES RESISTOR
*S 54	ANT. CURRENT METER SWITCHING

TRANSFORMERS	
SYMBOL	DESCRIPTION
T 50	TONE OSC.
T 51	MICROPHONE
T 52	MODULATION
T 53	MASTER OSC.
T 54	TRANS OUTPUT
T 55	ANT. CURRENT

MISCELLANEOUS	
SYMBOL	DESCRIPTION
TC 50	THERMOCOUPLE
M 50	ANT. CURRENT INDICATOR (LOCAL)
Y 50	CRYSTAL UNIT
F 50	20 AMP. FUSE
F 51	20 AMP. FUSE
RL 50	PARASITIC SUPPRESSOR
RL 51	PARASITIC SUPPRESSOR

FIGURE 6-274N





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...CITORS
MICROFARADS
.006
.05/.05/.05
.006
1.2
5/20.
1.2
.5/.5
.05
.05/.05/.05
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SYMBOL	DESCRIPTION
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F 50	20 AMP. FUSE
F 51	20 AMP. FUSE
RL 50	PARASITIC SUPPRESSOR
RL 51	PARASITIC SUPPRESSOR

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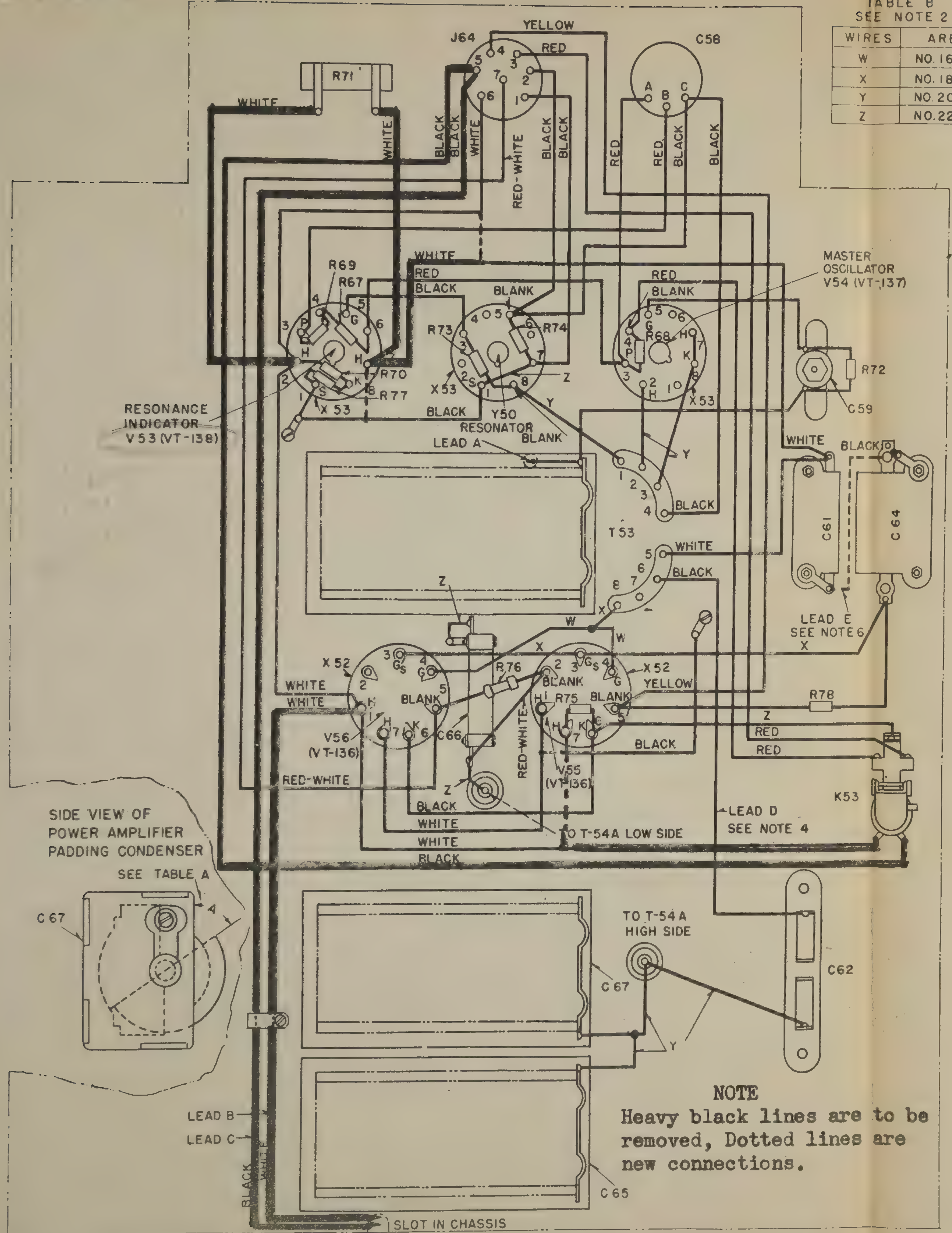
TABLE B
SEE NOTE 2

WIRES	ARE
W	NO.16
X	NO.18
Y	NO.20
Z	NO.22

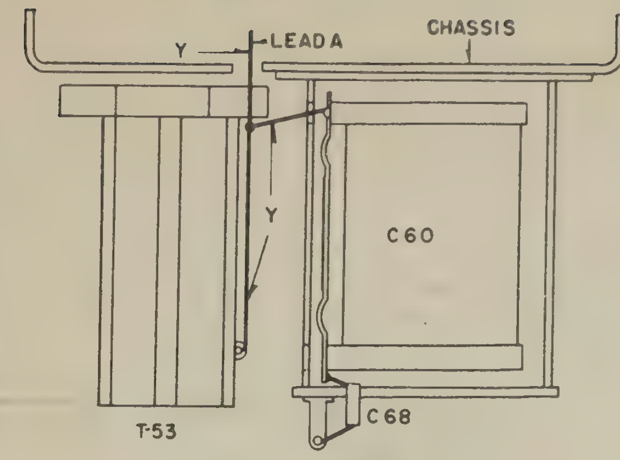


NOTE
Heavy black lines are to be removed, Dotted lines are new connections.

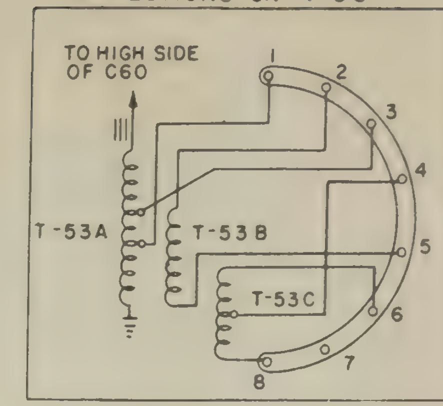
BOTTOM VIEW

FIGURE 5-274N

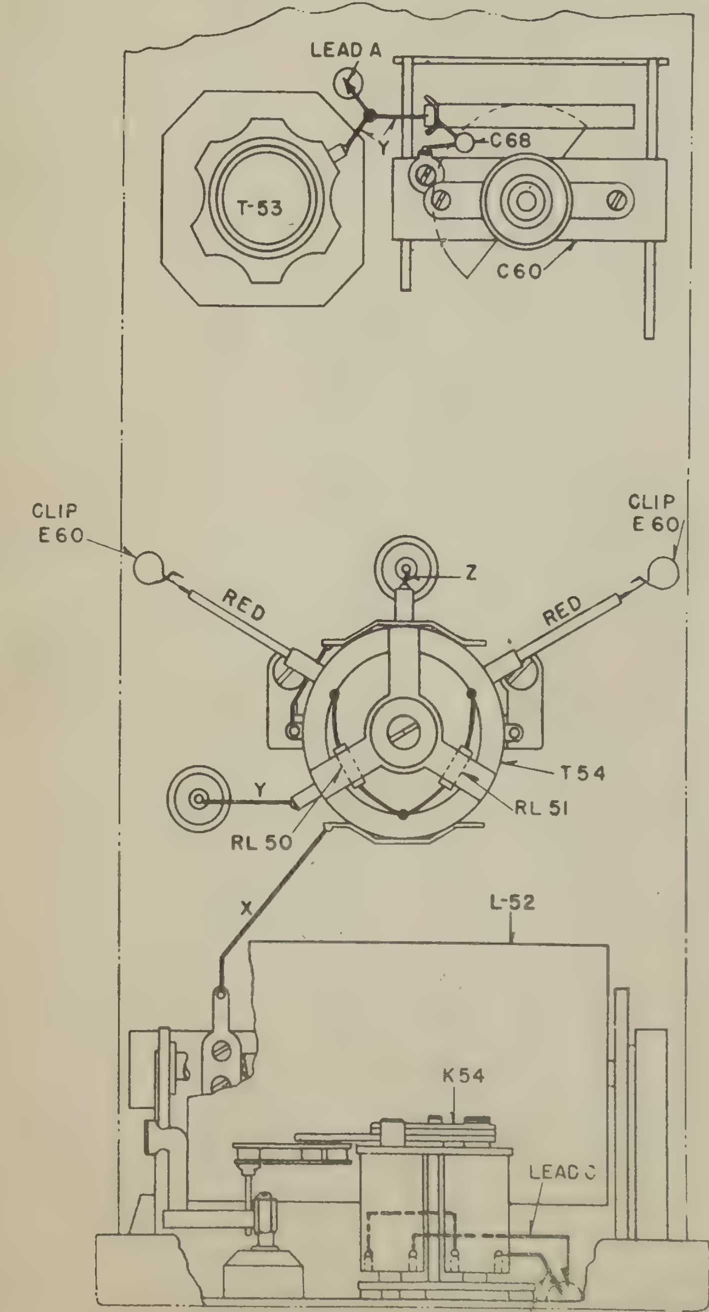
REAR VIEW



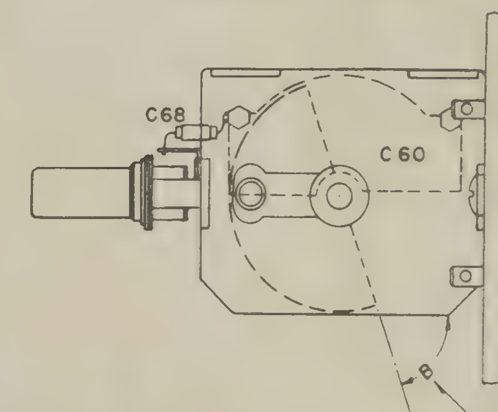
CONNECTIONS ON T-53



TOP VIEW



SIDE VIEW OF OSCILLATOR PADDING CAPACITOR



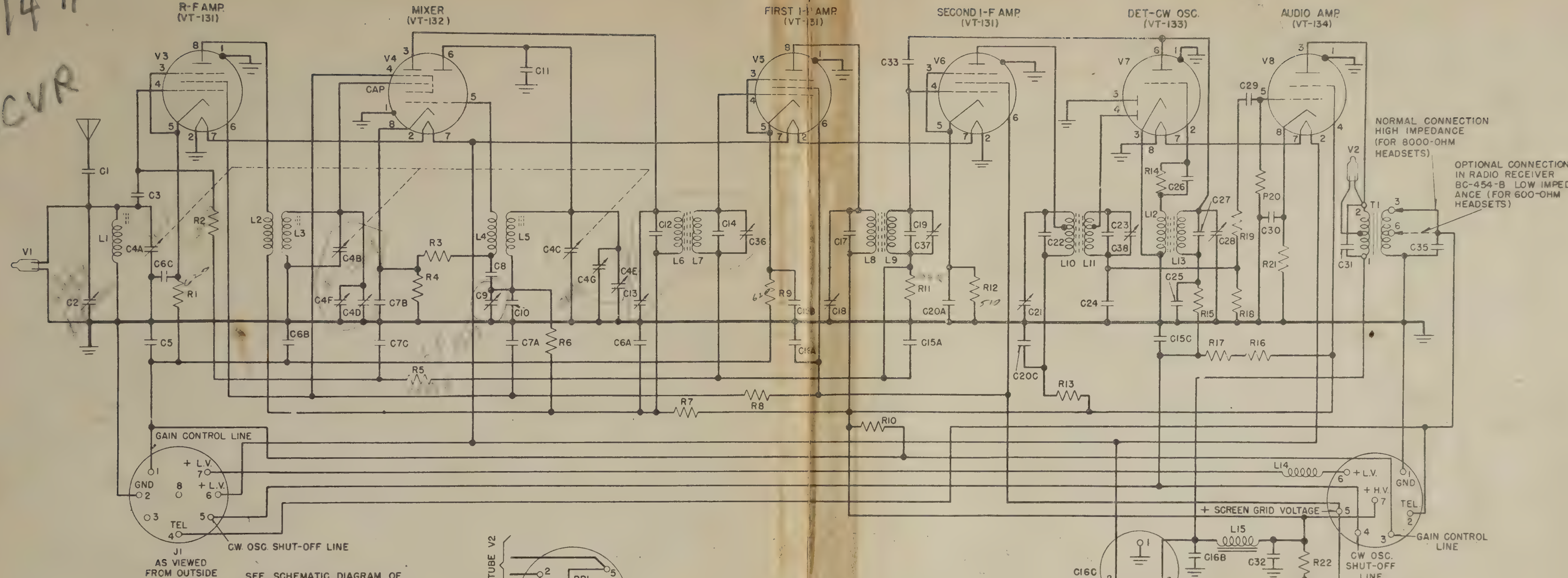
NOTES:

1. ALL WIRES MARKED WITH COLOR ARE NUMBER 22 SOLID COPPER. WIRES MARKED RED-WHITE HAVE HEAVY INSULATION.
2. WIRES MARKED W, X, Y AND Z ARE BARE TINNED SOLID COPPER WITH SIZES SHOWN IN TABLE B.
3. TERMINAL NUMBERS AND LETTERS ARE FOR REFERENCE PURPOSES AND DO NOT APPEAR ON APPARATUS.
4. PLACE LEAD "D" IN CORNER OF CHASSIS SO THAT IT WILL BE HELD SECURELY IN POSITION BY OTHER LEADS.
5. DRESS LEADS RUNNING NEAR THREADED INSERTS IN THE CHASSIS SO THAT SCREWS PROJECTING THROUGH INSERTS WILL CLEAR THE LEADS BY AT LEAST 1/16 INCH WHEN SCREWS ARE FULLY TIGHTENED.
6. GROUND TERMINAL ADDED TO C 61 AND LEAD "E" SHOWN IN DASHED LINES OMITTED IN LATER MODELS.
7. TERMINALS MARKED BLANK ARE TIE POINTS ONLY & HAVE NO CONNECTION TO TUBES OR CRYSTAL IN SOCKET.

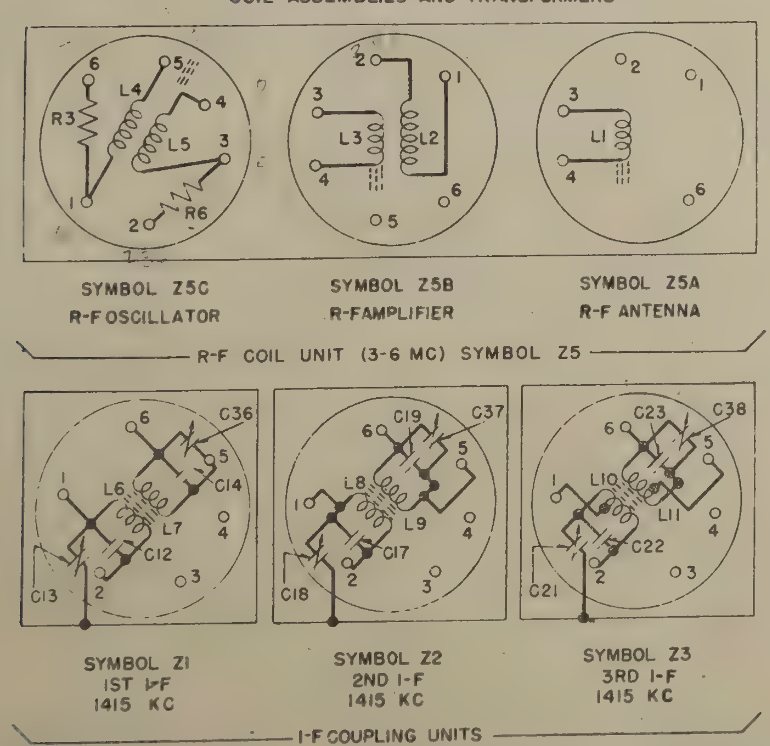
TABLE A

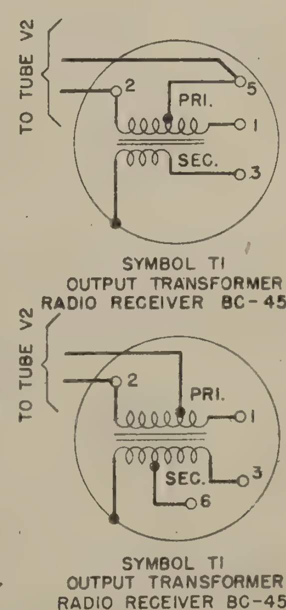
PADDING CONDENSER SETTINGS		
RADIO TRANSMITTER	C 67 ANGLE "A"	C 60 ANGLE "B"
BC-696-A (3-4 MC)	52°	77 1/4°
BC-457-A (4-5.3 MC)	53 1/2°	78°
BC-458-A (5.3-7 MC)	56°	81 1/2°
BC-459-A (7-9.1 MC)	73 1/2°	95 1/2°

274 N
RCVR



DETAIL SCHEMATIC DIAGRAMS
COIL ASSEMBLIES AND TRANSFORMERS

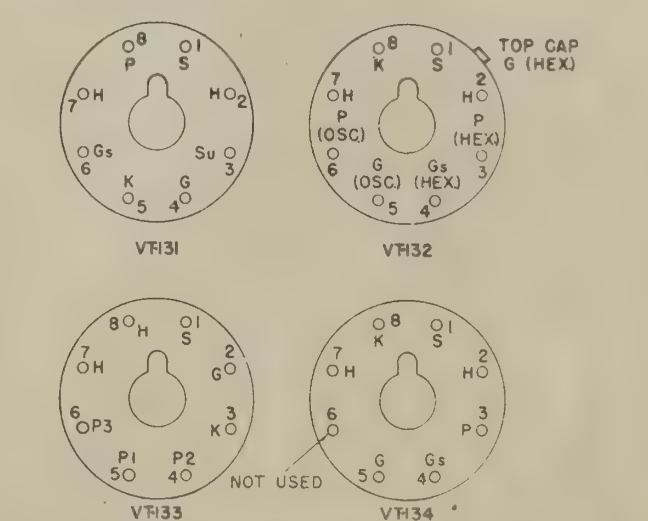




CIRCUITS IN R-F COIL SET, I-F COUPLING UNITS, C W OSCILLATOR, AND OUTPUT TRANSFORMER. THE TERMINAL NUMBERS ON THESE UNITS AGREE WITH THOSE SHOWN AT THE CORRESPONDING LOCATIONS ON THE PRACTICAL WIRING DIAGRAM.

CAPACITORS		INDUCTORS		RESISTORS	
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	OHMS
C1	11 MMF.	L1	ANT. INPUT	R1	620
C2	15 MMF.	L2, L3	RF AMP.	R2	2,000,000
C3	100 MMF.	L4, L5	RF OSC.	R3	51,000
C4 (A TO G)	GANG (147 MMF)	L6, L7	IN 1ST IF	R4	620
C5	3 MF	L8, L9	IN 2ND IF	R5	150,000
C6 (A,B,C)	.05/.05/.05 MF	L10, L11	IN 3RD IF	R6	200,000
C7 (A,B,C)	.05/.05/.05 MF	L12, L13	CW OSC.	R7	200
C8	200 MMF.	L14	RF CHOKE, 112 MICRO-HENRIES	R8	200
C9	40 MMF.			R9	620
C10	365 MMF.	L15	AF CHOKE 3 HENRIES	R10	360,000
C11	3 MMF.			R11	100,000
C12	180 MMF.			R12	510
C13	17 MMF.			R13	200
C14	180 MMF.			R14	100,000
C15 (A,B,C)	.05/.05/.05 MF			R15	5100
C16 (A,B,C)	.22/.22/.22 MF			R16	51,000
C17	180 MMF			R17	51,000
C18	17 MMF			R18	510,000
C19	180 MMF			R19	100,000
C20 (A,B,C)	.05/.01/.05 MF			R20	2,000,000
C21	17 MMF.			R21	1500
C22	180 MMF.			R22	7000
C23	180 MMF.			R23	7000
C24	200 MMF.				
C25	.001 MF				
C26	100 MMF.				
C27	180 MMF.				
C28	34 MMF.				
C29	.006 MF.				
C30	15 MF.				
C31	.001 MF				
C32	5 MF.				
C33	*				
C35	750 MMF.				
C36	17 MMF.				
C37	17 MMF.				
C38	17 MMF.				

* WIRING CAPACITANCE (LESS THAN 2 MMF.).



TUBE SOCKET TERMINALS AS VIEWED FROM BOTTOM

G = CONTROL GRID
G (HEX) = CONTROL GRID, HEXODE SECTION
G (OSC) = CONTROL GRID, OSC SECTION
Gs = SCREEN GRID
Gs (HEX) = SCREEN GRID, HEXODE SECTION
H = HEATER
K = CATHODE
P = PLATE
P (HEX) = PLATE, HEXODE SECTION
P (OSC) = PLATE, OSC. SECTION
P1 = FIRST DIODE PLATE
P2 = SECOND DIODE PLATE
P3 = TRIODE PLATE ON TUBE VT-133
S = SHELL
Su = SUPPRESSOR GRID

FIGURE 7-274N

BC-375-E TRANSMITTER

As it stands, the BC-375-E is a master oscillator power amplifier type transmitter. It has been proven to most amateurs that it is not wise to use it in the present form for much difficulty would be experienced in trying to keep within frequency tolerances and the transimtter will not produce the power it is capable of or built to stand. It is our suggestion that the transmitter be revamped to allow it to use the present oscillator stage as a power amplifer. It is also our suggestion that the SCR-274-N command set transmitter and modulator be used as driver stages for both audio and RF for it is a "natural" for the job and is available at low prices.

Present audio input of BC-375-E is for carbon mike, directly to the grid of the driver stage of a class "B" set-up. The driver is a "210" type tube and will do the driving nicely if sufficient audio voltage is applied to the grid of this stage.

The oscillator of BC-375-E when re-wired to function as a power amplifier or doubler requires quite a bit of power to drive it well, and this may be furnished by the SCR-274-N transmitter. This particular unit is suppressor grid modulated, has approximately fifty watts output at max coupling and is a "bang up" fine business VFO. We have only to utilize the modulation voltages of the 274-N to drive the BC-375-E audio and the RF output of the same equipment to drive the RF and we have a very fine rig at the lowest possible cost.

The information given here is not offered as the acme of ways to use the BC-375-E and may not be entirely scientific in its approach but it will serve as a rough guide and when used will give the amateur a thought to build upon and work out his own needs and ideas.

Three drawings are included, Figure 1, BC-375-E is the original circuit schematic. Figure 2, 375 is a practical wiring diagram which is necessary to show positions and wire placements. Figure 3, 375, Figure 3, 274-N, Figure 5, 274 shows schemes suggested above.

The BC-375-E has the necessary components to work over into many different rigs or it may be left in its original form or torn apart and re-assembled.

The proud possessor of a newly acquired BC-375-E may be somewhat cowed or intimidated by the appearance of the inside of the set. There is good reason for this because of the compactness and the maze of wires that seem to be connected to everything at once.

Perhaps if we offer the following tips and hints the way might not be hard and after becoming familiarized with the set, its compactness can be appreciated.

To start; completely strip the transmitter of all cover plates. These are the back, top, and sides and come off easily by removing the screws. May we suggest at this point that you get all small wrenches, screw drivers, pliers, socket wrenches and other sundry tools that may be found on the premises for the set is bolted together as solid as the Rock of Gibralter and it will take quite a variety of tools to break it down. Start at the top by cutting the leads that go to resistor 1196, that's the big filament dropping resistor, and remove it from its holding clamps by taking out the long mounting through the resistor.

Take out the screws that hold the resistor terminal board and lift the assembly off. Turn the transmitter upside down and unsolder those heavy, bare, tinned leads that reach back to the resistor strip that's mounted in the rear of the set. When there are no more solid bus leads to hold the resistor strip go to its ends and remove the two screws that hold each end to its mounts. A long heavy screw driver is required for the antenna tuner end for reaching through holes in the chassis. When the strip is free it may be manipulated enough to pull it out and back from the chassis. Now start with a sharp knife or razor blade to cut the binding cords that are used to cable the leads together. Don't try to save the pretty cabled appearance of the lead groups, for, too many leads will have to be removed or changed. Cut all the cord that can be reached for the looser the wires are the easier the work will be. Now with the wires loose and the strip pulled back, turn the set right side up and facing front. On the panel behind the oscillator tube compartment are four good sized binder head screws. Remove these and you will find the bakelite submounting panel for the audio input components is now loose. Pull it back from the panel and you can reach the nuts on choke 1146 mountings and those on the capacitator 1147. These formed a filiter for using 27 VDC in the carbon mike. Take the two parts off and there will be more room to work.

The article in "Dec. 1946 QST" suggests a speech amplifier stage that can be mounted in this space. This done, put the set back on its top and start removing the Tone-CW-Voice switch 1141. Snip off all leads first to facilitate things. Removing the shaft extension also speeds up the work; next, remove the trimmer and compensator condensors 1103 and 1104. These are beautiful pieces of work but we don't need them for the oscillator is to be changed to a power amplifier. (1104 is a bi-metal supported temperature compensating condensor) also remove the interlock switch 1102 and test key switch 1131 and while we are about it let's remove a few by pass condensors that are not immediately needed and will give us a little more space to work in. These are condensors 1142 (up on the panel that holds the power plugs) and 1150 (attached to the bakelite speech input mounting) and 1180 (on the inside of main resistor strip).

With these parts out we have one deft manipulation to perform before the actual wiring can be begun. In order to get to the audio amplifier tubes socket the modulation transformer must be lifted out of the way. The nuts on the transformer bottom are reached by a socket wrench through the antenna loading section. There is one nut that will give trouble. It is behind the RF switch 1168 in the loading section. After looking over the possibilities of removing the switch this department decided it wasn't worth the effort and so went to work on the nut with a long pin punch from the back of the transmitter. With a little patience the nut can be removed in this fashion. By pulling the resistor strip as far away from the set as possible to give more room, the audio transformer may be jockeyed out of position and pulled back and out of the way of the tube sockets.

Unsolder the leads from the voltmeter to the by-pass condensor and then take out the meter face screws for voltmeters and milliameter. By slipping the meters partly out of their mounting holes it is much easier to get into the wiring of the sockets.

Now with everything out of the way the re-wiring may proceed. Please note that there are two ground connections to the filament circuits that must be removed. These are copper straps and very solidly soldered to the minus filament terminal on the sockets of the master oscillator and one of the audio tubes.

We will not attempt to give a wire by wire description for there is the practical schematic 2-375 showing location and number of each part.

The audio line which formerly went to the aircraft sidetone circuits may be used to inject the audio driver

power. This winding is tapped so that most any audio amplifier can be matched into it. The tap switch 1179 is adjusted from the front and is on the panel behind the tubes. The wiring for this is shown in diagram 3. The sidetone was taken from a winding on the driver transformer. The taps on this transformer are approximately for the following impedances:

No. 1— 150 ohms
No. 2— 400 ohms
No. 3—2000 ohms
No. 4—4000 ohms

This is a fair range of taps and should allow the use of practically any type amplifier to be found in the usual ham shack.

For audio drive from a smaller voltage source of power use the jack shown that goes to the primary of the mike transformer 1149.

For the RF input we installed a Jones S-101 type coax socket in the front panel in the hole left from the "test key". A lead was soldered from the contact of this plug to the grid line behind the Parasitic suppressor of the former oscillator. A small transmitter condensor of 50 MMFD was put in place of the tone CW-VOICE switch and connected across the oscillator grid. (This is not shown in the drawing). This was used to aid in resonating the various types of RF input tried. For those who do not wish to use the audio driver tube, the socket may be utilized for a plug-in input grid coil. This would work out very nicely for all purposes.

The antenna relay possesses little merit for AC voltage operation . It is simpler to screw down the limit adjustments till relay is closed and leave it in that position, although it may be used by employing dry cell batteries.

For CW operation the antenna relay shorted out resistor 1115 thus lowering the bias on the tube grids. The Hi voltage negative return was across this resistor thereby biasing all tubes to cut-off. This type keying may be preserved by bringing the shorting lead for this resistor to a jack located on the panel.

For bias the best and simplest method are "B" batteries. Modulator tubes require 72-75DC volts, speech amplifier requires 35-40 DC volts. To simplify wiring a biasing controlled as usual by potentiometers provided in the original.

In order to use the tuning units supplied it will be necessary to change or modify them somewhat. As they are now there will be insufficient driving voltage to the final grid and the taps on the coil must be changed. We suggest the owner look up a December 1946 copy of QST for reference to coil changes.

BC 375E
Xmitter

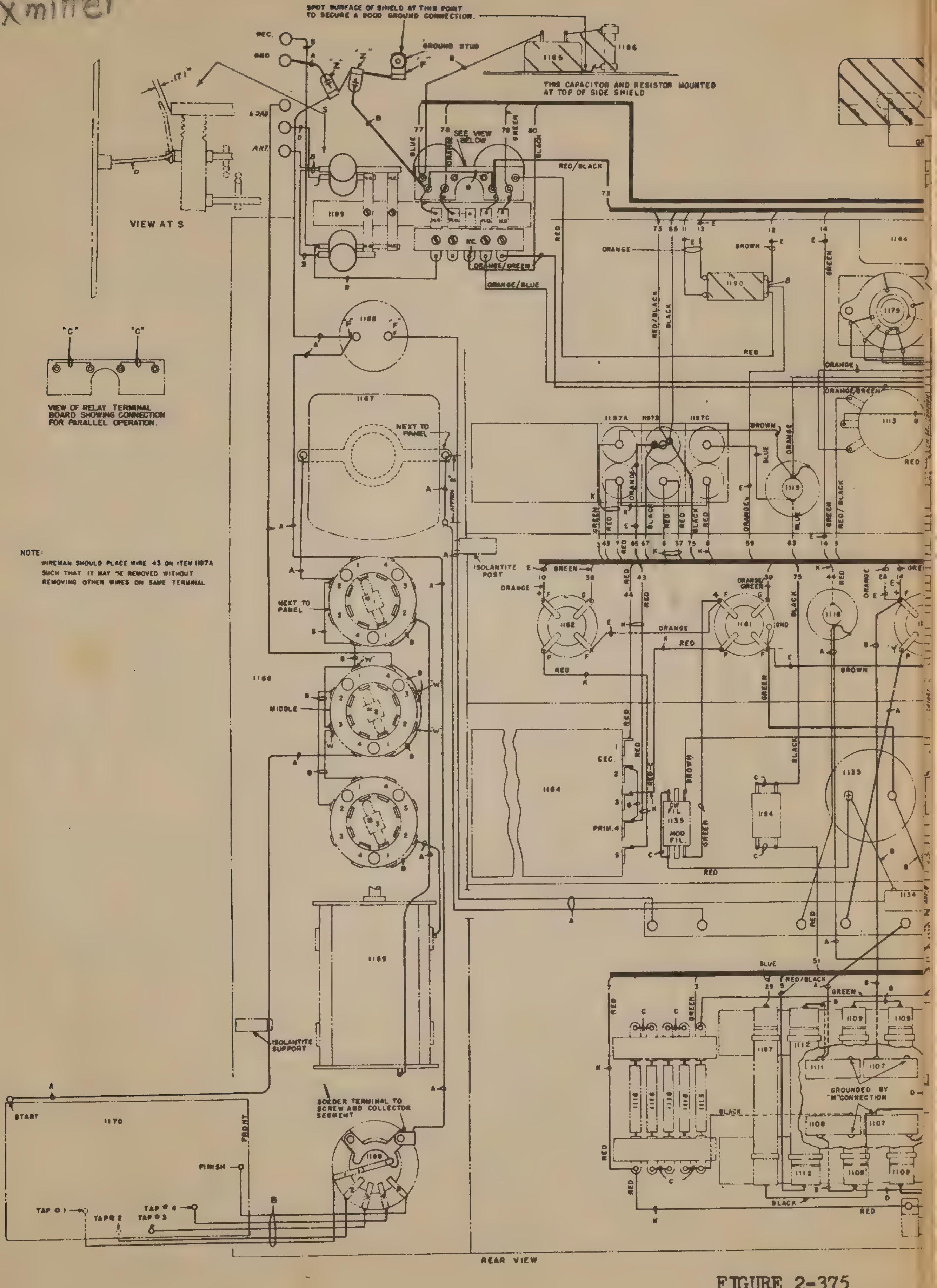


FIGURE 2-375

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BC 375E
xmitter

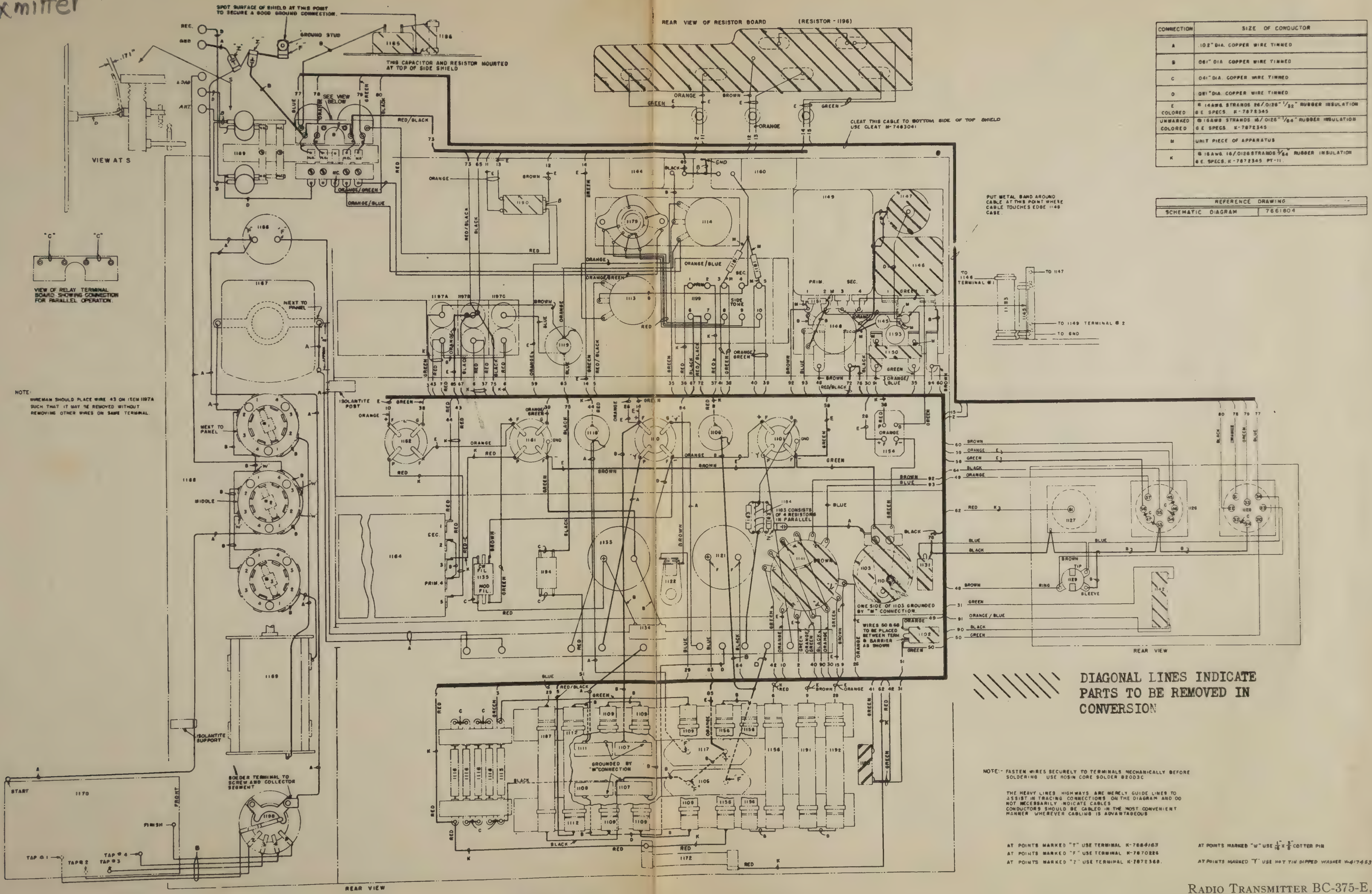
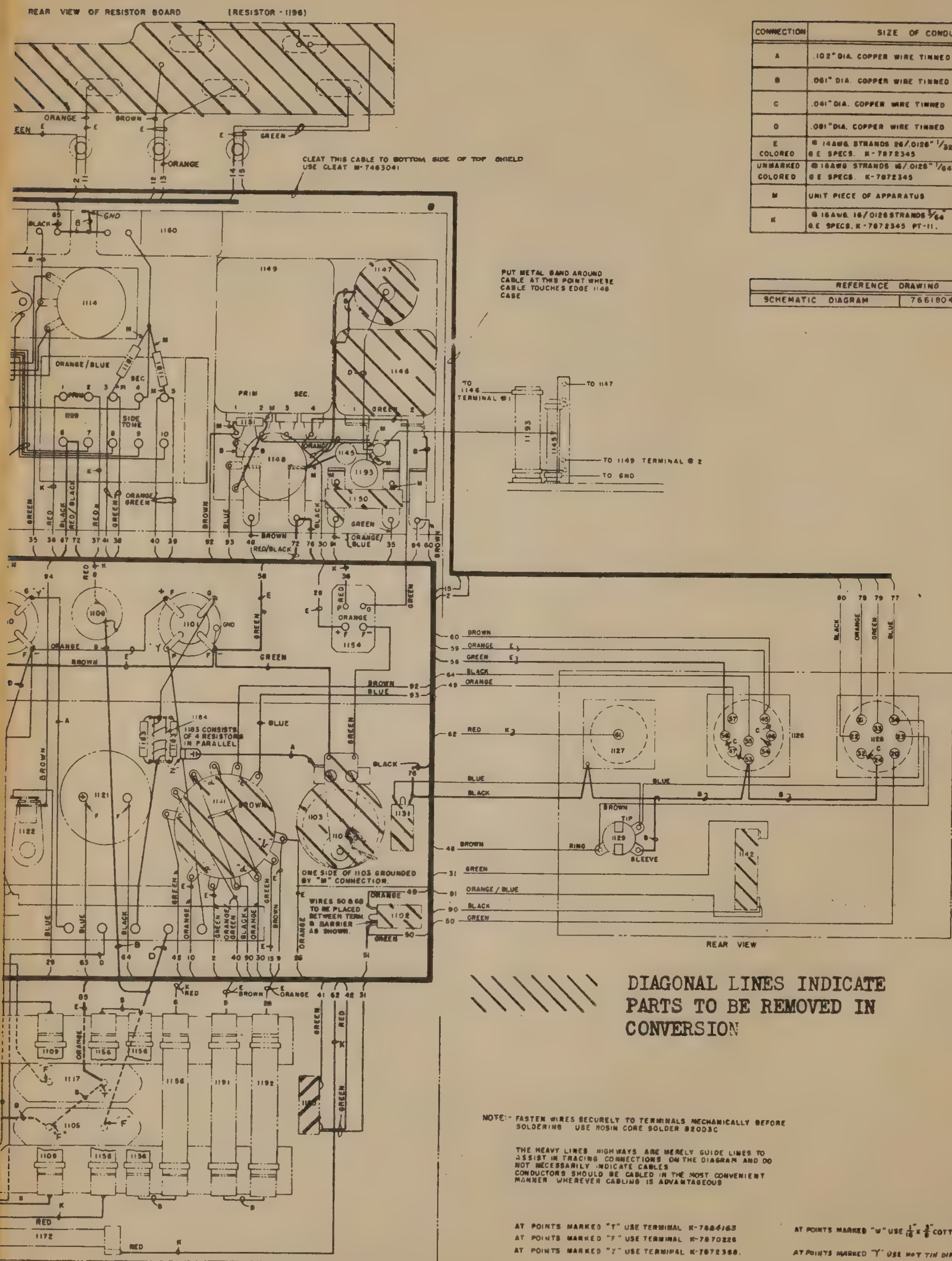


FIGURE 2-375

Radio Transmitter BC-375-E,
Connection Diagram



CONNECTION	SIZE OF CONDUCTOR
A	.102" DIA. COPPER WIRE TINNED
B	.081" DIA. COPPER WIRE TINNED
C	.041" DIA. COPPER WIRE TINNED
D	.081" DIA. COPPER WIRE TINNED
E COLORED	# 14AWG. STRANDS 26/.0126" 1/32" RUBBER INSULATION G.E. SPECS. K-7872345
UNMARKED COLORED	# 16AWG. STRANDS 16/.0126" 1/64" RUBBER INSULATION G.E. SPECS. K-7872345
M	UNIT PIECE OF APPARATUS
K	# 16AWG. 16/.0126 STRANDS 3/64" RUBBER INSULATION G.E. SPECS. K-7872345 PT-11.

REFERENCE DRAWING	
SCHEMATIC DIAGRAM	7661804

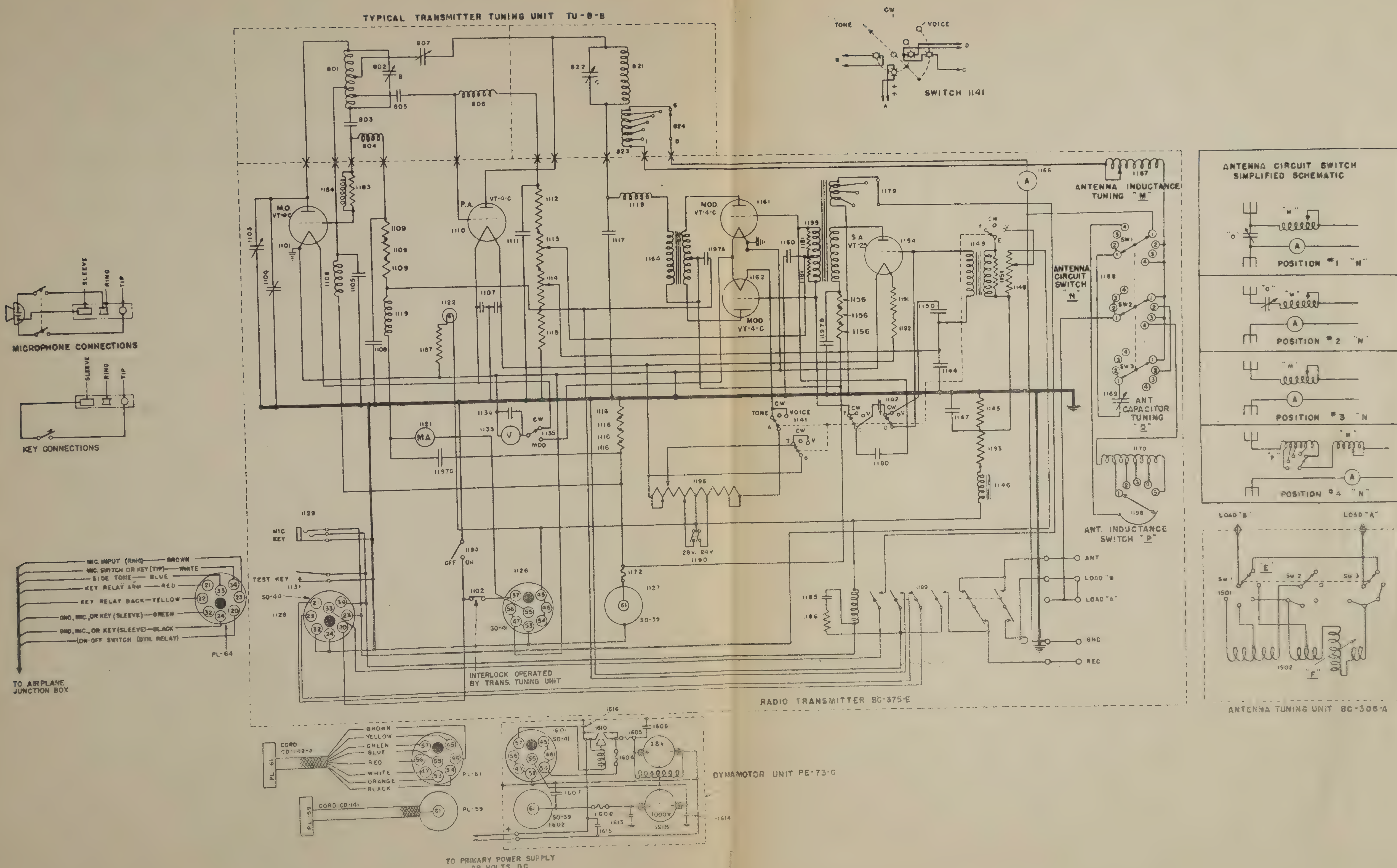
NOTE:- FASTEN WIRES SECURELY TO TERMINALS MECHANICALLY BEFORE SOLDERING USE ROSIN CORE SOLDER 82003C

THE HEAVY LINES HIGHWAYS ARE MERELY GUIDE LINES TO ASSIST IN TRACING CONNECTIONS ON THE DIAGRAM AND DO NOT NECESSARILY INDICATE CABLES
CONDUCTORS SHOULD BE CABLED IN THE MOST CONVENIENT MANNER WHEREVER CABLING IS ADVANTAGEOUS

AT POINTS MARKED "T" USE TERMINAL K-7684163
AT POINTS MARKED "F" USE TERMINAL K-7870226
AT POINTS MARKED "Z" USE TERMINAL K-7872368.

AT POINTS MARKED "W" USE 1/16" x 3/8" COTTER PIN.
AT POINTS MARKED "Y" USE HOT TIN DIPPED WASHER W-417453

RADIO TRANSMITTER BC-375-E, CONNECTION DIAGRAM



TYPICAL TRANSMITTER TUNING UNIT TU-8-B
SWITCH 1141
TONE
VOICE
ANTENNA CIRCUIT SWITCH SIMPLIFIED SCHEMATIC
POSITION #1 "N"
POSITION #2 "N"
POSITION #3 "N"
POSITION #4 "N"
ANTENNA INDUCTANCE TUNING "M"
ANTENNA CIRCUIT SWITCH "N"
ANT CAPACITOR TUNING "O"
ANT. INDUCTANCE SWITCH "P"
M.O. VT-4-C
P.A. VT-4-C
MOD VT-4-C
S.A VT-25
MICROPHONE CONNECTIONS
SLEEVE
RING
TIP
KEY CONNECTIONS
MIC KEY
TEST KEY
MIC. INPUT (RING)—BROWN
MIC. SWITCH OR KEY (TIP)—WHITE
SIDE TONE—BLUE
KEY RELAY ARM—RED
KEY RELAY BACK—YELLOW
GND, MIC., OR KEY (SLEEVE)—GREEN
GND, MIC., OR KEY (SLEEVE)—BLACK
ON-OFF SWITCH (DYN. RELAY)
TO AIRPLANE JUNCTION BOX
PL-64
SO-44
SO-41
SO-39
OFF
ON
INTERLOCK OPERATED BY TRANS. TUNING UNIT
ANT
LOAD "B"
LOAD "A"
GND
REC
RADIO TRANSMITTER BC-375-E
ANTENNA TUNING UNIT BC-306-A
CORD CD-142-A
BROWN
YELLOW
GREEN
BLUE
RED
WHITE
ORANGE
BLACK
PL-61
CORD CD-191
PL-59
DYNAMOTOR UNIT PE-73-C
TO PRIMARY POWER SUPPLY 28 VOLTS D.C.

Figure 1-375

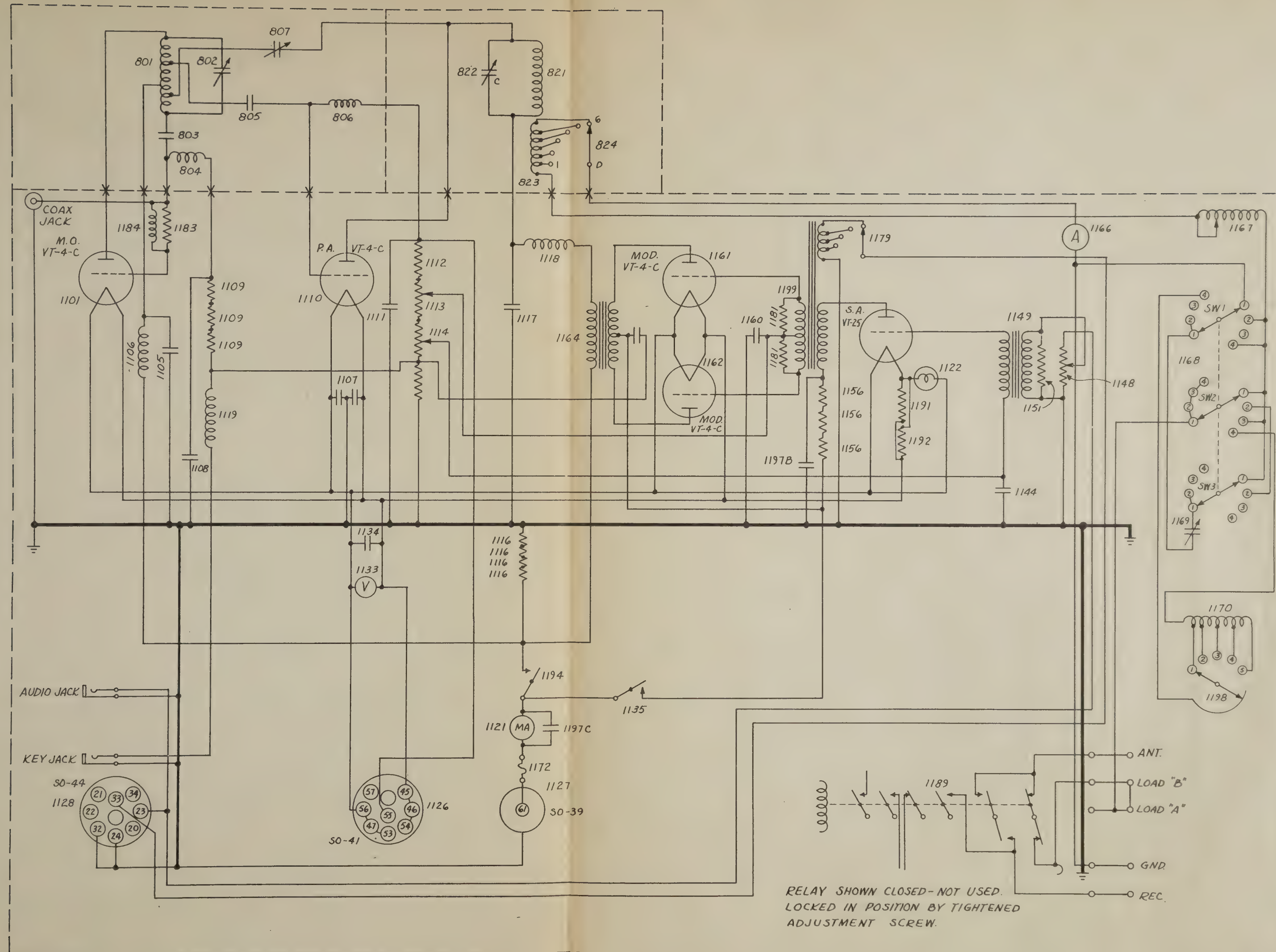

807
801
802
822
C
821
805
806
803
6
824
804
D
823
COAX JACK
1184
1183
M.O. VT-4-C
1101
P.A. VT-4-C
1110
1112
1113
1114
1111
1118
1117
MOD. VT-4-C
1161
1164
1162
MOD. VT-4-C
1179
1199
1160
1181
S.A. VT-25
1156
1122
1191
1192
1197B
1166
1167
1149
1148
1151
SW1
SW2
SW3
1168
1169
1144
1109
1106
1105
1107
1119
1108
1134
1133
1116
1194
1135
1121
1197C
1172
1127
SO-39
1170
1198
AUDIO JACK
KEY JACK
SO-44
1128
SO-41
1126
1189
ANT.
LOAD "B"
LOAD "A"
GND.
REC.
RELAY SHOWN CLOSED - NOT USED.
LOCKED IN POSITION BY TIGHTENED
ADJUSTMENT SCREW.

FIG. 3-375

X

LIST OF DRAWINGS FOR SCR-522

SCR-522

Many articles have appeared, to date, in different radio publications offering various means of converting the SCR-522 VHF set. These articles are good and we have tried them, but there is one thought we should like to put forth that no previous article has mentioned. This is, simply use the SCR-522 in its original case and not bother to separate transmitter from receiver and build separator panels, chassis and power supplies. We even find it convenient to leave on the band changing equipment and thus utilize a quick change of bands for the transmitter.

With the receiver and transmitter left in the case and with the rack FT-224 left on to connect to the terminals of them it is only necessary to incorporate the few simple changes given in the following drawings and script and we have a table mount VHF that is small and very convenient.

To convert the SCR-522 for power pack operation and retain the equipment case we need only to modify the rack FT-224. The following plans and desciptions will give a fair idea of how this is done. When the changes are completed a Prestwood panel is installed over the face of the rack with cut-outs over the transmitter crystal sockets and tuning dials, an O-1 milliameter mounted in the panel in the space left by cutting away the body of the ratchet motor. Shaft extensions are brought out to knobs for the receiver tuning controls and gain controls for Receiver and Transmitter. The metering switch of the transmitter is also extended to the panel.

RACK CHANGES FOR 522

1. Open the two hinged covers on the set, by turning with a screw driver, the four DZUS fastens, now remove the four hinge bolts that are at the corners of the frame and lift off the hinge covers. BC-624 and BC-625 are attached to FT-224 (the frame work that holds the two together) by four each, shoulder studs. These are easily found for they are painted **red.** Before loosening these studs grasp the ratchet motor, which drives the band changing mechanism, and by alternately squeezing and releasing the armature (the movable part of the motor), identified by the two coil springs attached to one end. Force the mechanism through one cycle, far enough to bring all plungers back to neutral. Now take out the red studs and gently pry the rack FT-224 off the transmitter and receiver. This can be accomplished by slipping a screw driver under the rack and gently prying it up.

2. Lay out FT-224 and take out the two end screws and the four screws around each plug of the center cover and the plate may be lifted off.

3. With wire cutters, snip the leads to the two power and control plugs and remove same, snip leads to the ratchet motors and take out by removing four screws on the back of the rack and on the top, attached to the plunger frame. Next to go are the three relays 411-1, 411-2 and 412 (they have numbers printed beside each one on the frame) the screws holding these are easily found. Next to come out are condensors 401, 402 and switch 426. We also remove antenna plug 416 and its mounting base. The antenna plugs which connect to the transmission and receiver are a part of this assembly and must be put back. Now cut out all the original wiring with the exception of the braid covered leads connected to pins 1 and 2 off transmission plug 418-1. The net result of our labors thus far is a chassis or frame stripped of all it held with the exception of three plugs and the tuning slides.

4. Drill a ¾" hole in the center of the right hand handle grip pocket. When drilled (or routed out with a rat tail file) slip the antenna connector through the hole and with a scriber mark the 4 screw holes and drill with a ⅛" drill. Fasten the antenna connector screws before replacing the transmitter receiver plug strip for the bottom screws are impossible to reach if not put in first. Next we install the power plug. This may be most any type of plug or strip which will fit into the width of the side of FT-224. We could of course use the original plug in the original place but this would spoil the appearence and be in the way in front of our panel. There are many types of plugs available. We used a Jones plug of 6 contacts because it was small and flat sided. A terminal strip on the outside would do just as well. At any rate, it is suggested that it be installed on the left side of the rack as close to the bottom as possible without interfering with transmitter plug 418-1.

Cut out the metal bracing strip in the upper left hand corner as marked in 192 as it will be in the way of the shaft extension of the audio control beneath it. As the band changing ratchet motor will not function on AC we must modify this useful piece of equipment. First remove all the screws and bolts until we have all parts removed from the frame. Now with a hacksaw cut the frame in three places as shown in **Figure 3A,** with cutting done we tap out the shaft hole in the ratchet with an 8-32 tap. This allows one of the red painted studs that formerly held rack FT-224 to transmitter-receiver assembly to be screwed into ratchet wheel shaft thus giving us a shaft to attach a knob to. Cut ⅜" from the screw end of the small shaft that formerly went through the ratchet wheel and spread it slightly by tapping with a hammer until it is a force fit into the bottom end of the ratchet wheel shaft. Be sure to allow it to protrude enough to go into the hole punched for it in FT-224 for it serves as a guide pin in aligning the ratchet motor frame. We now have only to ream out the top shaft hole in the motor frame to 5-16" and by reassembling the band control is finished as shown in **Figure 3 B.**

In the left hand grip pocket drill two ⅝" equally spaced holes to receive mike and headset jacks.

522 RECEIVER

The receiver as it stands is crystal controlled and therefore is bound to whatever frequencies the operator possesses crystals for.

This may be rectified in a number of ways. The first suggestion tried by us works out very well but has bad feature of high cost. Four Bliley VFI variable frequency crystals were obtained and plugged into the receiver. Fair coverage was obtained in the two meter band. Tuning is sharp but clumsy because of the complex controls, which made it necessary to check the receiver through the range with a signal generator before using it in order to log the dial positions.

Changing the crystal circuit to a self exciting oscillator did not cure the headaches of tuning, but by using a very small tuning capacity nice coverage over the 2 meter band was obtained by fixing the RF and Harmonic generator first and then tuning by the ex-crystal stage. complete revision of the RF end or the 522 receiver would of course be the ideal solution but to us, and to most others, the challenge was to evolve a usable circuit from the original. Of all the ideas advanced toward this end we find that the best was offered by Ray Frank, Amateur Editor, Radio News in the October 1946 issue of that magazine. This article gives the necessary pertinent data for changing the harmonic generator to an oscillator and reduces the set controls to two knobs. That system has worked out best of all. The control knob of the harmonic generator must be geared 40 or 50 to 1 in order to keep the tuning from being critical. Also the RF line up. To most users the critical point was not noticed in the RF stages as the sets are used for local rag-chewing but the RF is capable of good gain and sharp tuning when properly aligned.

In an effort to spread the 2 meter band across a wider portion of the dial or get away from the high ratio tuning dial and critical alignment of stages the old device of inserting a series condensor in the tuning circuit was tried. National type M-30 trimmer condensors were inserted between the coil and tuning condensor, these have a maximum capacity of 30 MMF. This effectively reduces the capacity of the tuning condensors to the point where the band is spread out appreciably.

TRANSMITTER

One good use for the BC-625 transmitter that has been overlooked by many amateurs is 6 meter band operation. The plate circuit of the oscillator is tuned to the second harmonic of the crystal, this is fed to the first harmonic amplifier whose plate circuit is resonated to the 3rd multiple of the 2nd harmonic or the 6th crystal harmonic. Using a 8.5833 k. c. crystal in the oscillator puts 51.5 m. c. to the grids of the 2nd harmonic amplifier it remains only to wind up new tank coils for the second harmonic amplifer and final tank.

DYNAMOTOR

The SCR-522 is designed to operate from two D. C. sources, 14 and 27 volts. There is a separate motor generator built to operate from each of these voltages, PE-94-A is the 27 volt unit and PE-98-A for 14 volts. PE-98-A for 14 volt operation are scarce for few airplanes had a 14 volt battery system. Most SCR-522 now available come equipped with PE-94-A. There is no difference in the transmitter and receiver for they are in all cases wired for 12 volts filament and relay control. Each genemotor has a low voltage commutator delivering 12 volts for transmitter-receiver. In some instances 12 volt battery operation may be desired and only a PE-94-A is available. By making a number of changes in the field windings of the genemotors and combining the motor action of the 27 volt motor end together and by using battery source for filaments and relays, operation of SCR-522 may be used. This is not satisfactory from a perfection point of view for we loose ampere turns in the field and there is no way to reduce the number of turns or increase the wire size of the motor winding of the armature. New field windings may be wound up and successfully used but this writing will not attempt this for it is doubted that many experimentors will be interested. The following diagrams are given for those who may wish to have on hand an emergency hookup that can be done in a short while and requires nothing more than a few solder connections.

In using the SCR-522 we must have a power supply. The one that came with it originally was designed to operate with a D. C. input of 27 VDC at a current of 13 amperes. To most people this is not an ideal set up for 27 volt storage batteries are not generally found around the average household. However, close examination of the power genemotor supplied with the SCR-522 will reveal that it may be used as a straight generator provided: Some external mechanical means are used to furnish the rotating power. Tests in actual operation have proven that ¼ horsepower is needed for the job. The generator is already equipped with ½ inch shaft to fit a standard "V" pulley to and by turning the generator end for end in its mounting the pulley will protrude enough to attach a belt to it.

COLONIAL MODEL

Take out the scews on both ends of the cover. You will find the dynamotor held in position by a steel compression strap. On the low voltage end of the dynamotor you will find three large leads colored green, blue and yellow. On the high voltage end there are three smaller leads colored red, orange and green with a braided ground strap attached to the genemotor case.

The large wires are: yellow, positive 27 volts to field and motor winding, blue, positive 27 volts from carbon file regulators to shunt control field of genemotor. The smaller wires are: red, positive 300 volts plate supply; orange, minus 150 volts bias voltage for transmitter; green (brown, black, white according to model) is 14.5 volts positive for filament and relay supply to SCR-522.

1. Remove the wires from the high and low voltage connections and unscrew the connecting bolt from the compression band that holds the genemotor.

2. Lift the dynamotor from the case and remove the end bell covers from both ends. The low voltage end cover is the shorter of the two and is held by two screws in the end case. The longer cover is held by four screws arranged around the circumference of the dynamotor case.

3. You will find a blower fan on the armature shaft at the high voltage end of the dynamotor. This is held by two allen set screws. Remove the fan.

4. With a circle cutter make a one-and-one half (1½) inch hole in the end center of the shorter end bell cover.

5. Remove all four screws from the bearing cover at the high voltage end of the dynamotor and put the short end bell cover over this end. Use two screws only to hold the bearing cover plate and end bell cover.

6. The longer end bell cover may be left off for better cooling or slipped on and held by a bank of masking or

adhesive tape, or, better still, drill and tap the low voltage end bell for 6-32 screws so the cover will attach as it did when on the opposite end.

7. As the dynamotor will be placed back in the chassis in a reversed position to allow the shaft end to protrude, the case must be altered slightly to allow for this. Assume that the right hand end of the chassis is when viewed facing the unit with both plugs toward you, with a pair of tin snips cut out the steel mesh screen in the chassis cover on the right hand side also the bottom and back side supports for the screen. Now a small curved section in the top, bottom and back of the right hand end must be removed to allow room for the dynamotor end bell cover to protrude. We do this the easy way by placing the dynamotor in the chassis with the shaft flush with the right end then inscribe with a divider compass a 2¼" radius and cut out the sections of arc that were within the radius. **Figure 2** gives the idea.

8. Now the dynamotor may be put back in its cradle and strapped down. The leads are replaced in this manner. Large yellow lead in its original place on top of 2 of the start-stop relay. Large green lead under the small bolt that held the braid grounding strap. Remove the short red lead from taps 1 and 3 off the start-stop relay and low volts input filter and using taps 1 and-or, 3 as a terminal place the large blue lead and the smaller blue lead coming from the carbon file regulator together. Replace the red, orange and brown leads going from the high voltage parts of the genemotor in their original positions—it may be necessary to cut a new feed through hole in the firewall separating the generator from the filter compartments due to short length of large leads.

9. We now have a genemotor that will supply the high and low voltages required by the SCR-522. It may be driven by an electric motor or gas engine. The usual ¼ horsepower motor will drive this generator if not overloaded. Reading from the manufacturers plate on the dynamotor we find that it originally ran at 4700 RPM. The closer to that speed the generator is run the better regulation is obtained by the carbon file regulator. However, by using a ¼ HP motor with a 5" "V" pulley and 2" "V" pulley on the generator sufficient voltage is obtained for good operation.

SOCKET CONNECTIONS

CONTROL HEAD TO TRANSMITTER-RECEIVER

FITS

	PIN NUMBERS																		
PL169	1	2		4	5			6	7				11	12	10	3	8	9	CONTROL HEAD
PL170	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	CENTER PLUG SCR-522
			x			x	x												

FITS

TWO ENDS OF BALANCED, CENTER TAPPED MIKE INPUT TRANSFORMER

AUDIO OUTPUT LEAD

FIGURE I

NOTE:
ALL PLUG PINS IN UPPER BOXES ARE CONNECTED TO PINS IN LOWER BOXES. AS AN EXAMPLE PIN NO. 7 OF PL169 IS CONNECTED TO PIN NO. 9 OF PL170.

SOCKET CONNECTIONS

POWER SUPPLY TO TRANSMITTER- RECEIVER

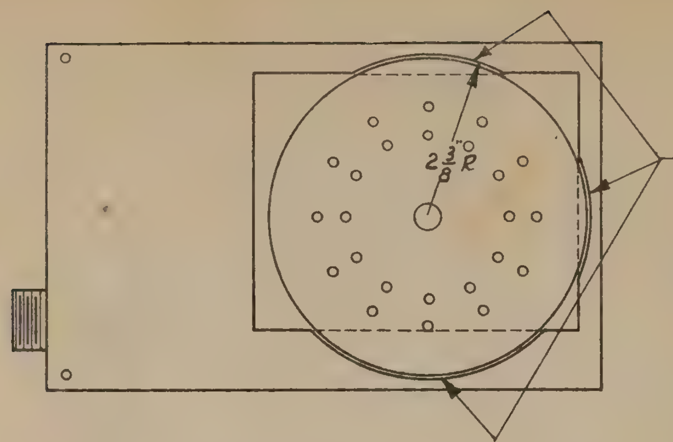
FITS

	PIN NUMBERS						
PL171	1	2	3	4	5	6	END PLUG SCR-522
PL169	1	2	3	4	5	6	POWER SUPPLY

FITS

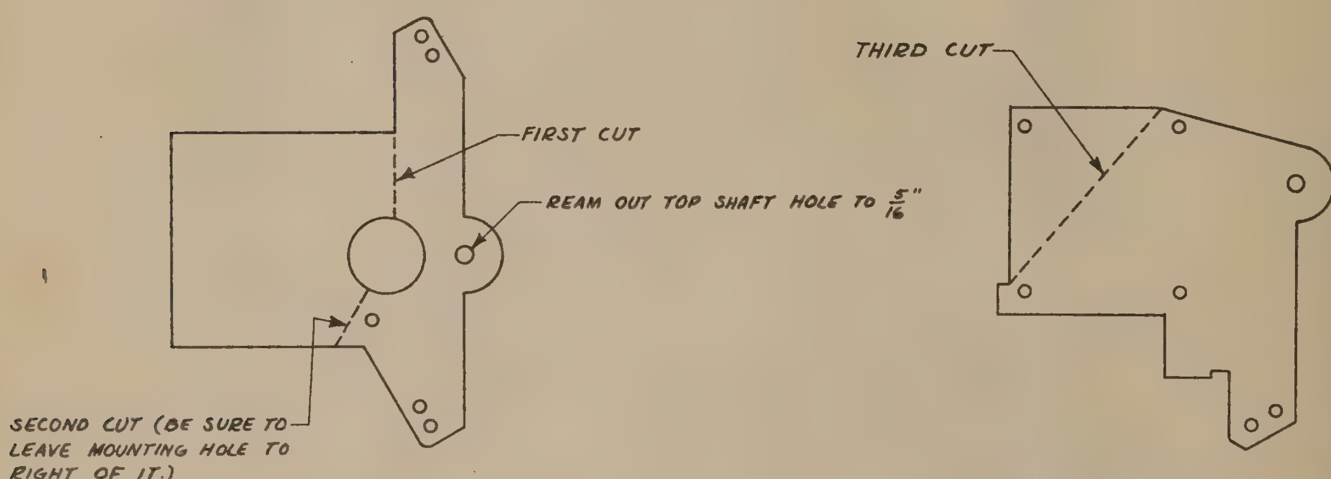
FIGURE 2-522

NOTE:
THESE CONNECTIONS FOR USE OF SCR-522 WITH SET UNCHANGED AS TO CIRCUIT.



NOTE
SLIP THE DYNAMOTOR BACK IN THE CASE AND USE THE CENTER HOLE IN THE SHAFT TO CENTER THE DIVIDERS USED TO STRIKE THE ARC.

FIGURE 2 A 522



TOP VIEW OF STRIPPED RATCHET MOTOR FRAME

BOTTOM VIEW

FIGURE 3A

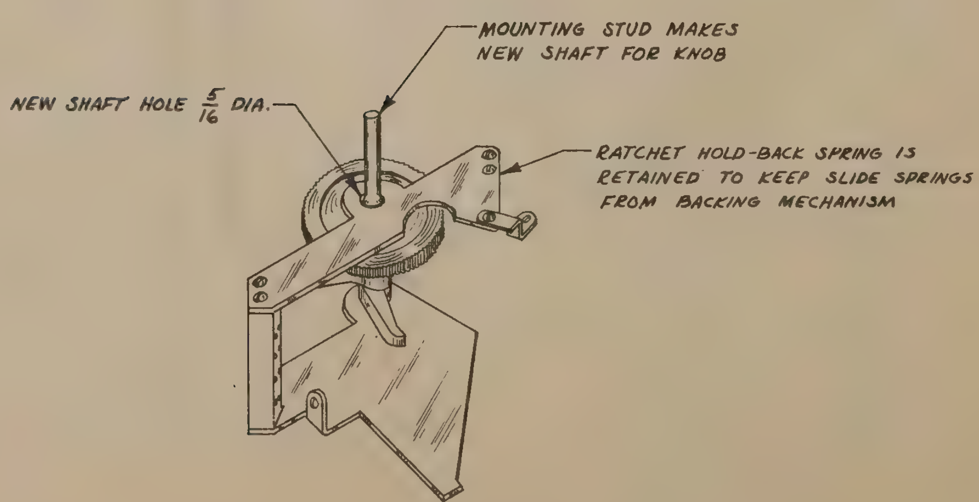
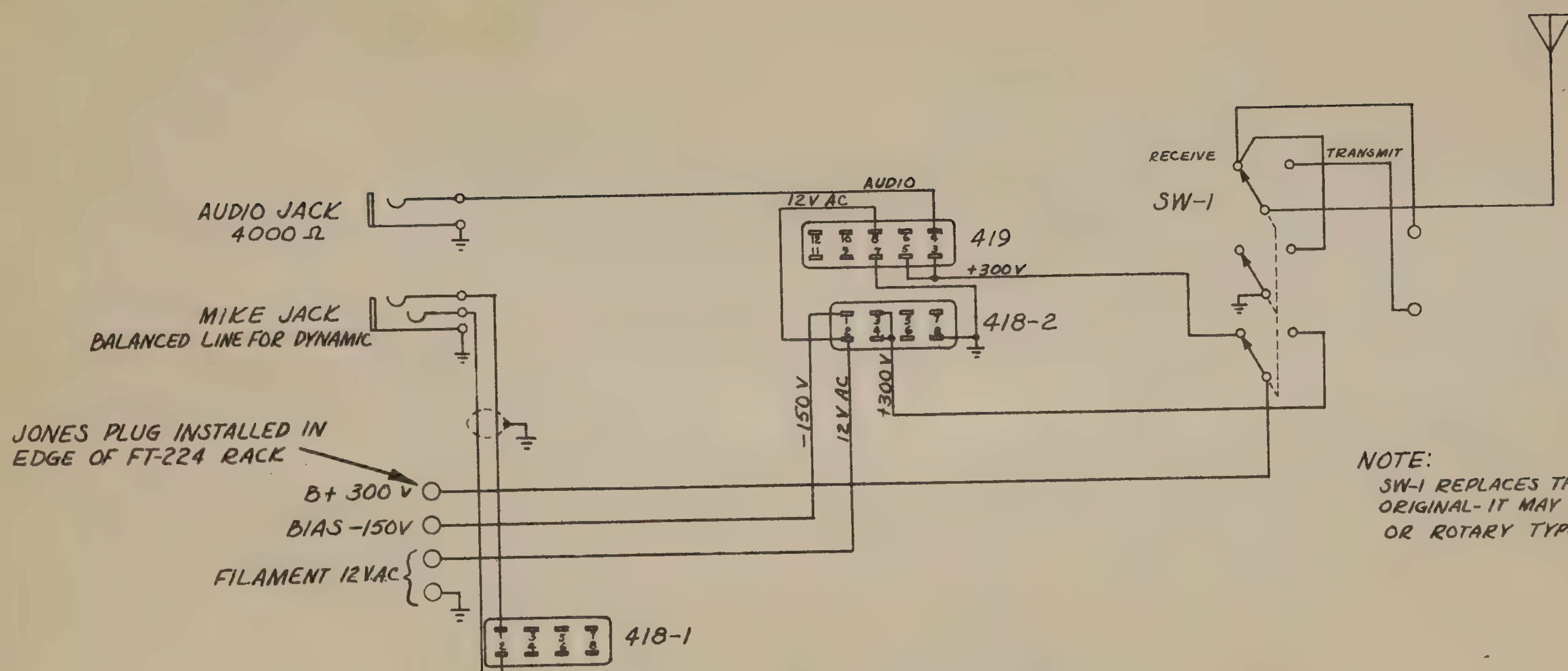


FIGURE 3B-522



NOTE:
SW-1 REPLACES THE 24 V. D.C. ORIGINAL- IT MAY BE OF THE TOGGLE OR ROTARY TYPE.

FIGURE 4-522

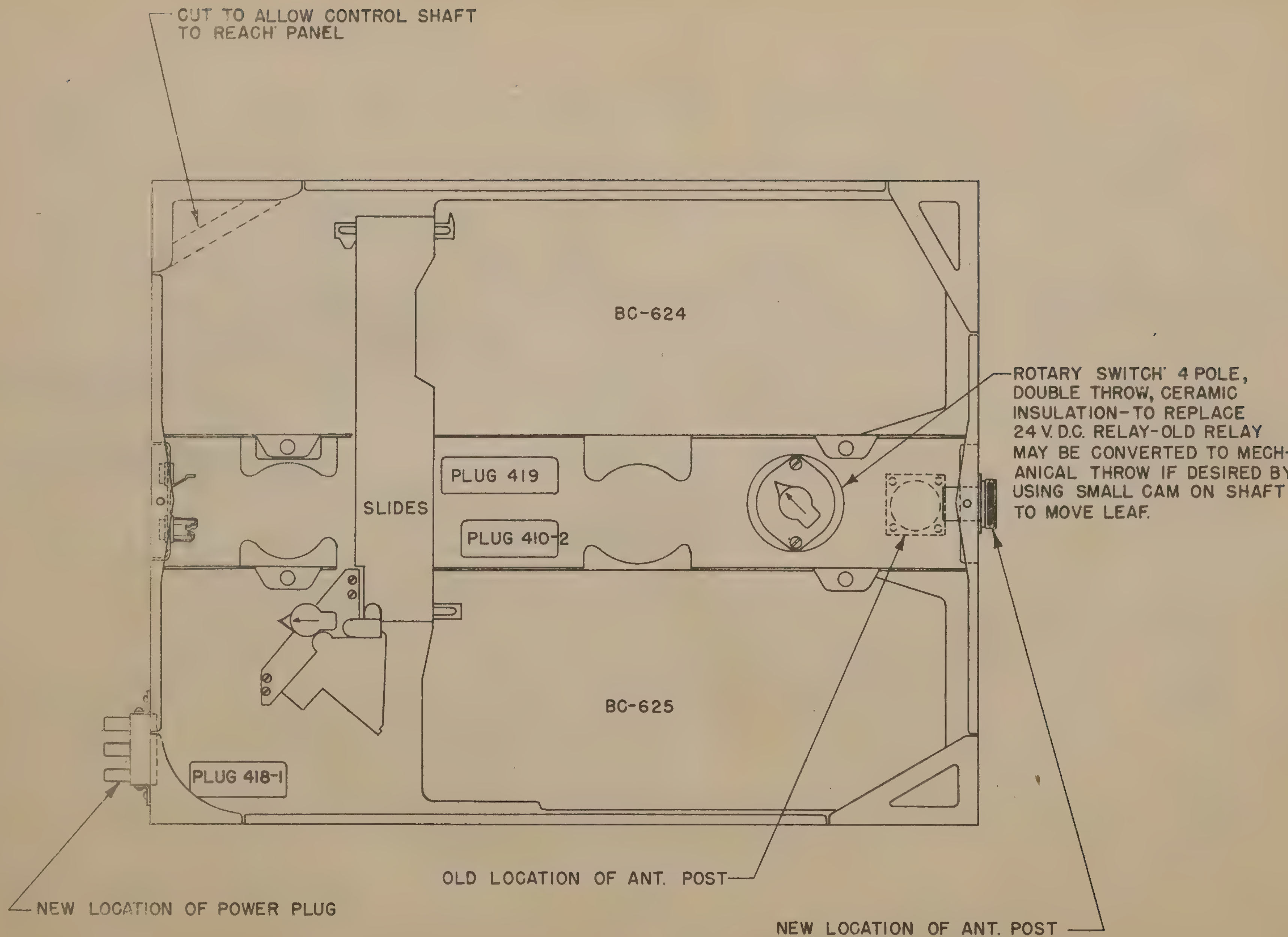
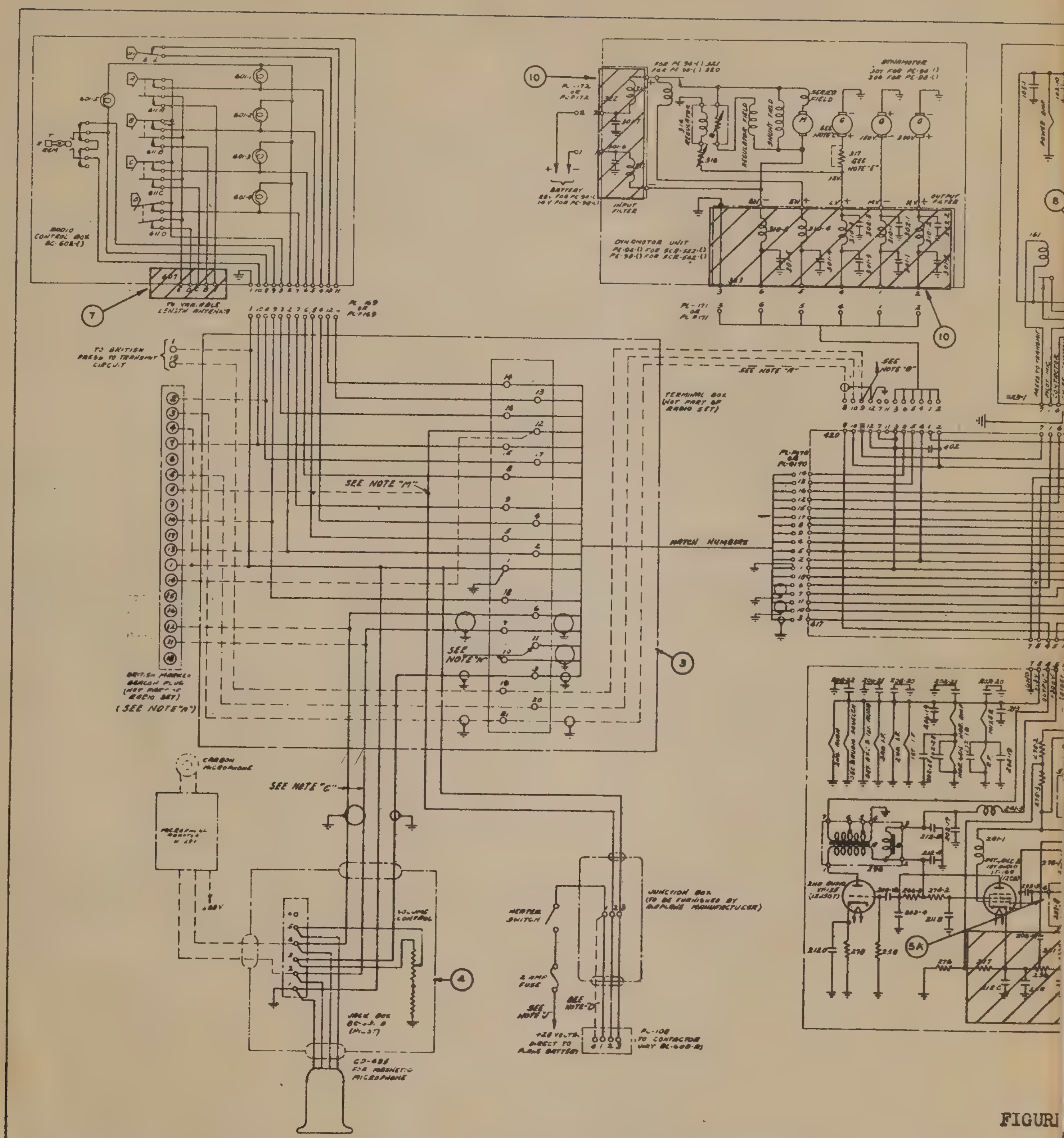
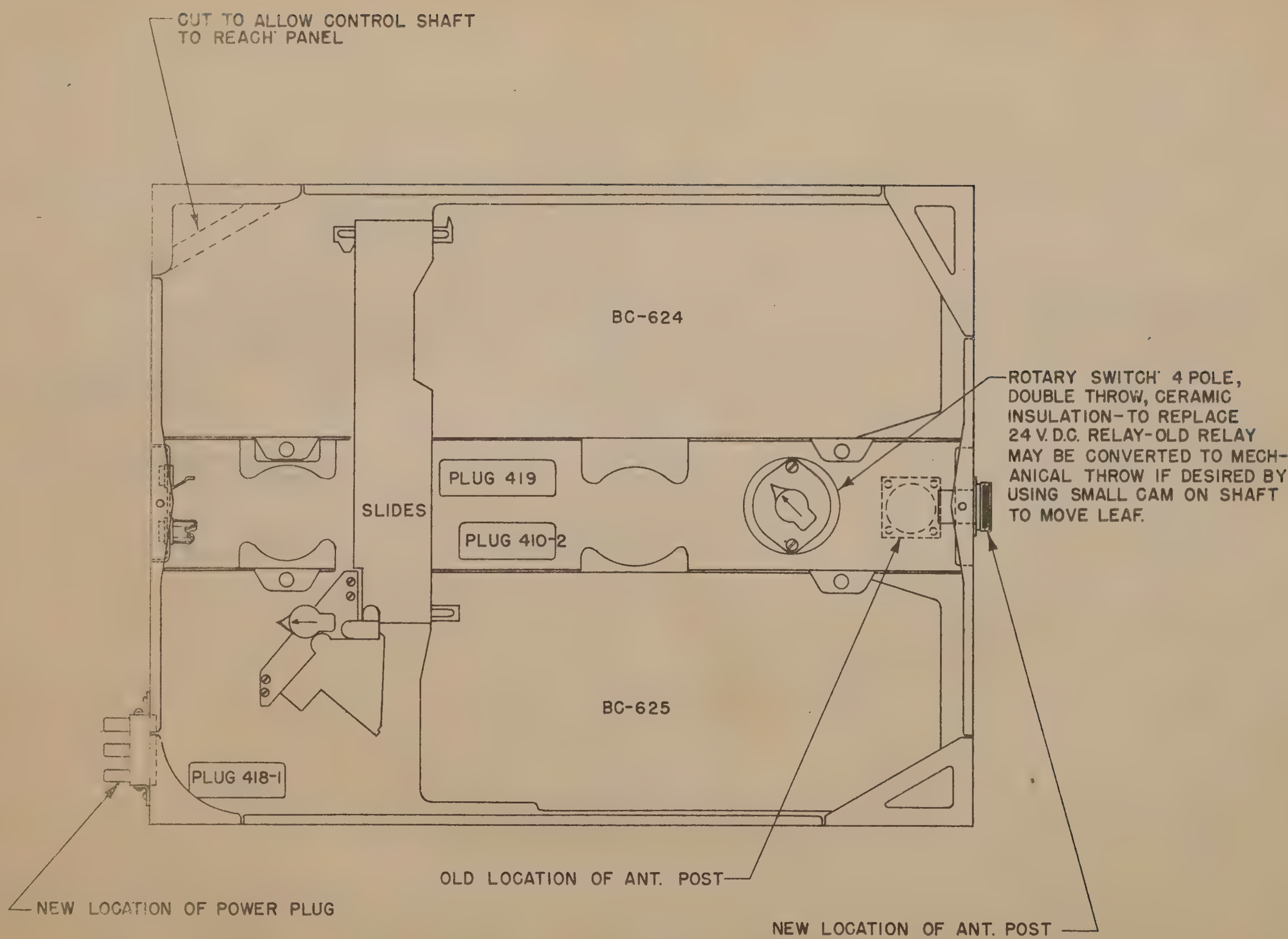

CUT TO ALLOW CONTROL SHAFT TO REACH PANEL
BC-624
SLIDES
PLUG 419
PLUG 410-2
ROTARY SWITCH 4 POLE, DOUBLE THROW, CERAMIC INSULATION-TO REPLACE 24 V. D.C. RELAY-OLD RELAY MAY BE CONVERTED TO MECHANICAL THROW IF DESIRED BY USING SMALL CAM ON SHAFT TO MOVE LEAF.
BC-625
PLUG 418-1
OLD LOCATION OF ANT. POST
NEW LOCATION OF POWER PLUG
NEW LOCATION OF ANT. POST

FIGURE 5-522


RADIO CONTROL BOX BC-602-( )
DYNAMOTOR
BATTERY
INPUT FILTER
OUTPUT FILTER
DYNAMOTOR UNIT
SERIES FIELD
SHUNT FIELD
REGULATOR FIELD
TERMINAL BOX (NOT PART OF RADIO SET)
SEE NOTE "A"
SEE NOTE "B"
SEE NOTE "M"
WATCH NUMBERS
SEE NOTE "N"
SEE NOTE "C"
(SEE NOTE "A")
CARBON MICROPHONE
VOLUME CONTROL
JUNCTION BOX (TO BE FURNISHED BY AIRPLANE MANUFACTURER)
HEATER SWITCH
SEE NOTE "J"
SEE NOTE "D"
POWER AMP
2ND AUDIO

FIGURI



CUT TO ALLOW CONTROL SHAFT TO REACH PANEL
BC-624
SLIDES
PLUG 419
PLUG 410-2
ROTARY SWITCH 4 POLE, DOUBLE THROW, CERAMIC INSULATION-TO REPLACE 24 V. D.C. RELAY-OLD RELAY MAY BE CONVERTED TO MECHANICAL THROW IF DESIRED BY USING SMALL CAM ON SHAFT TO MOVE LEAF.
BC-625
PLUG 418-1
OLD LOCATION OF ANT. POST
NEW LOCATION OF POWER PLUG
NEW LOCATION OF ANT. POST

FIGURE 5-522

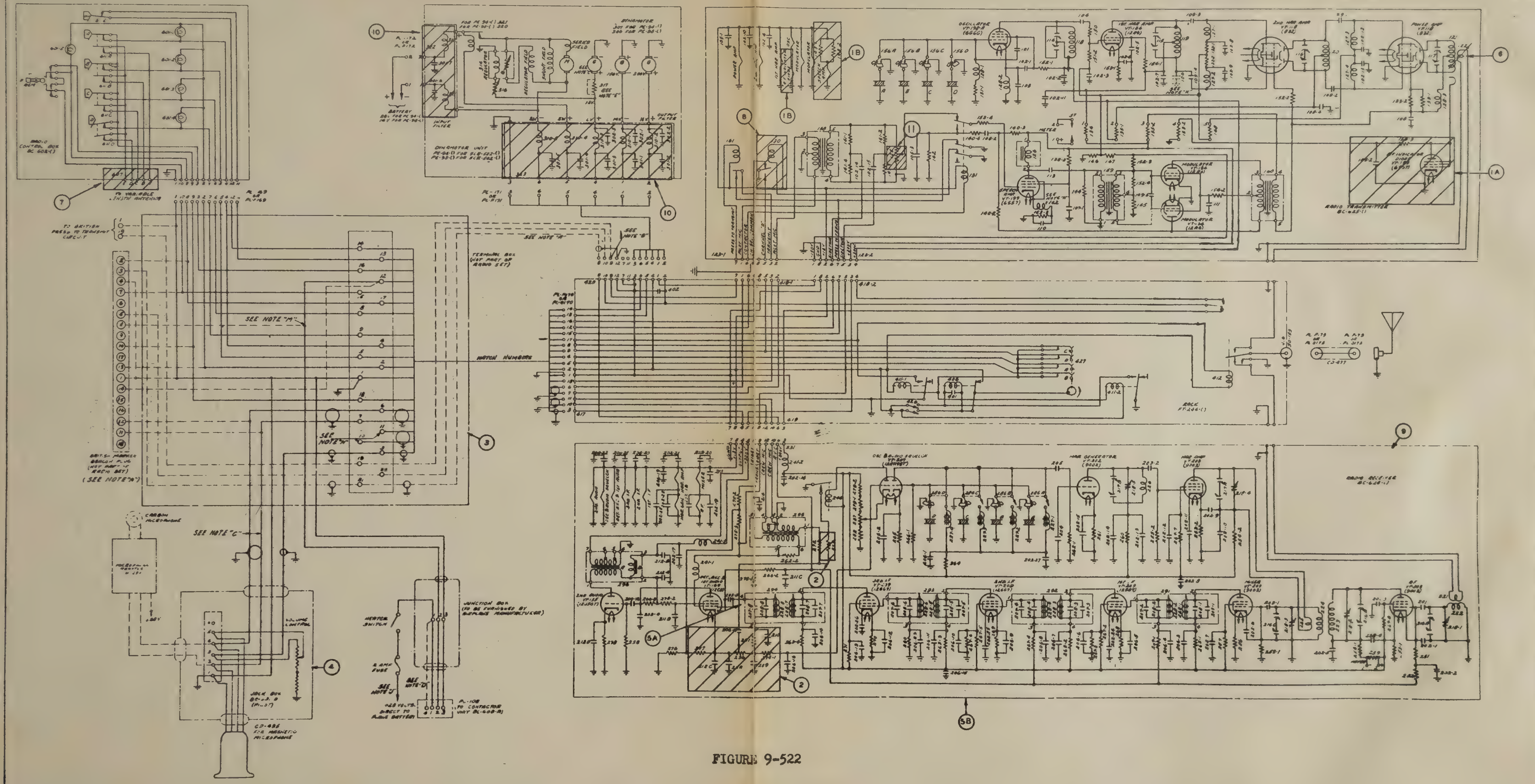
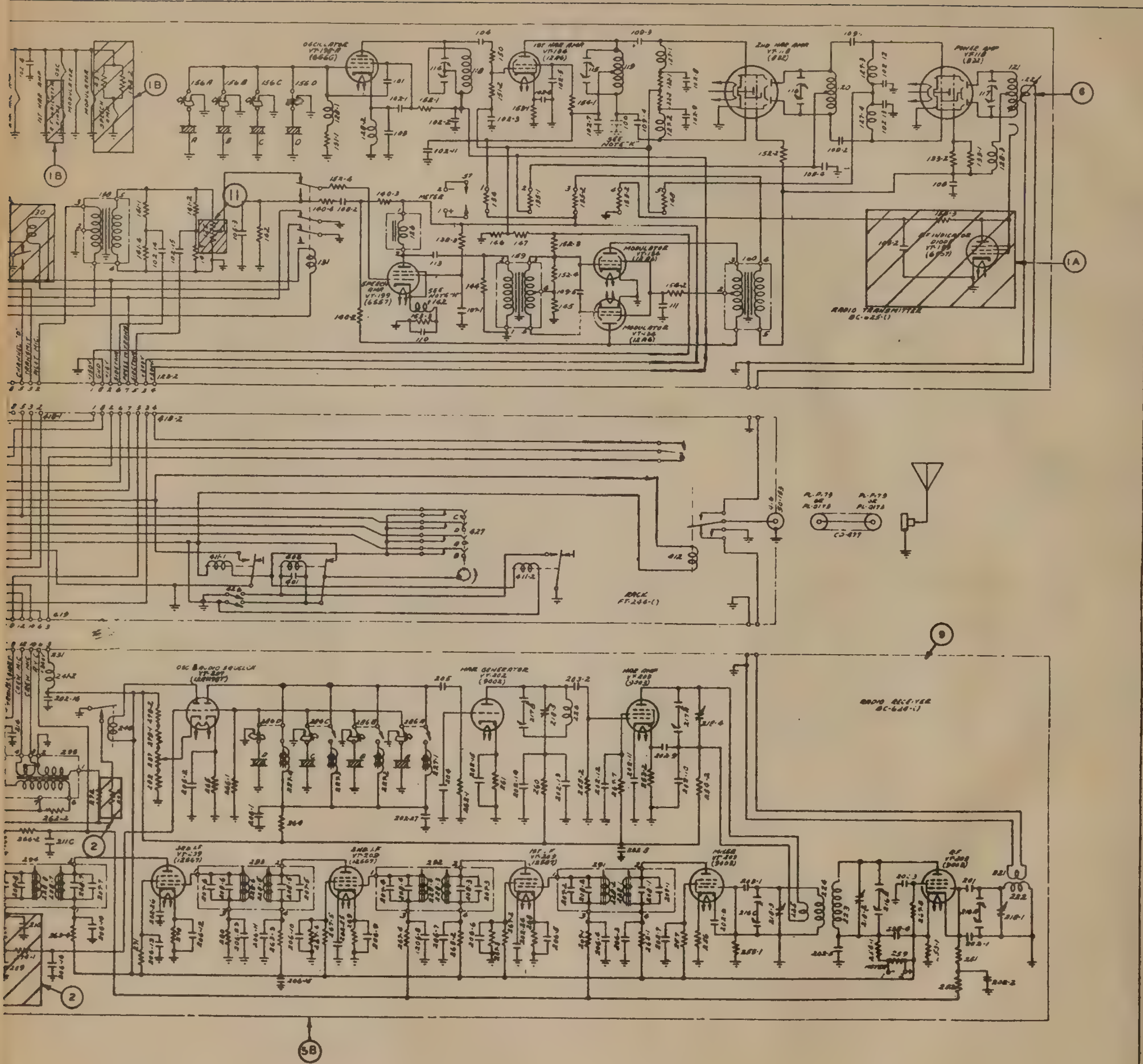


FIGURE 9-522



9-522

RECEIVER

BC 624-AM

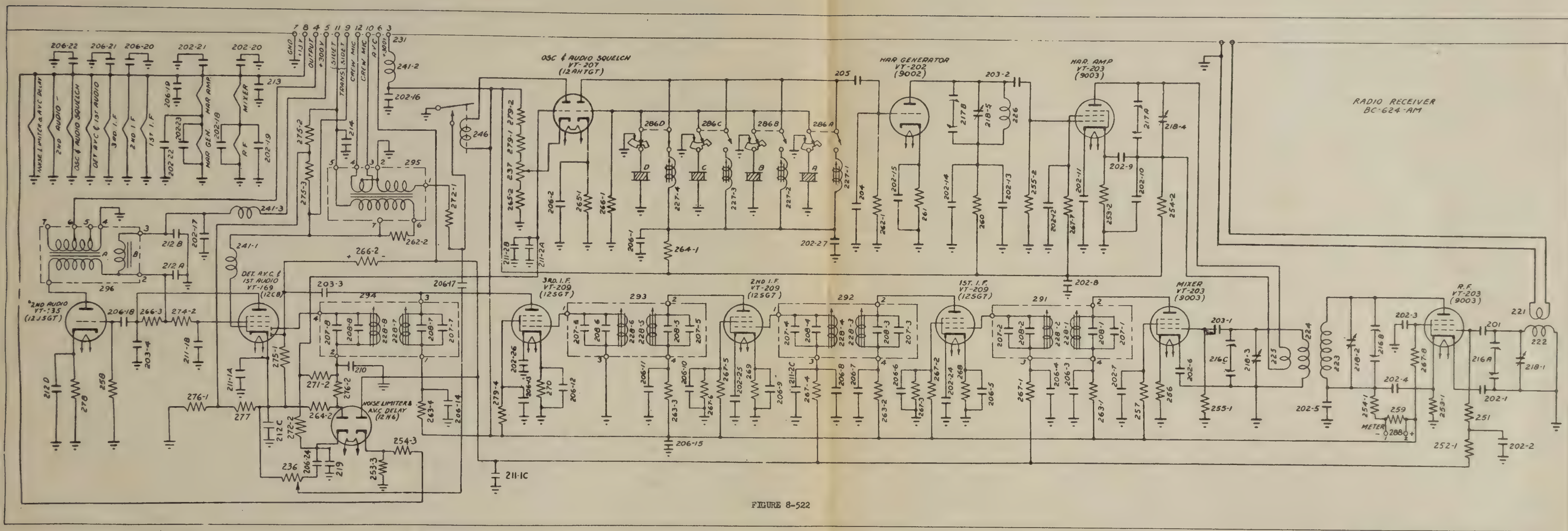


FIGURE 8-522

Radio Receiver BC-624-AM—Schematic Diagram

BC625-AM
RCVR

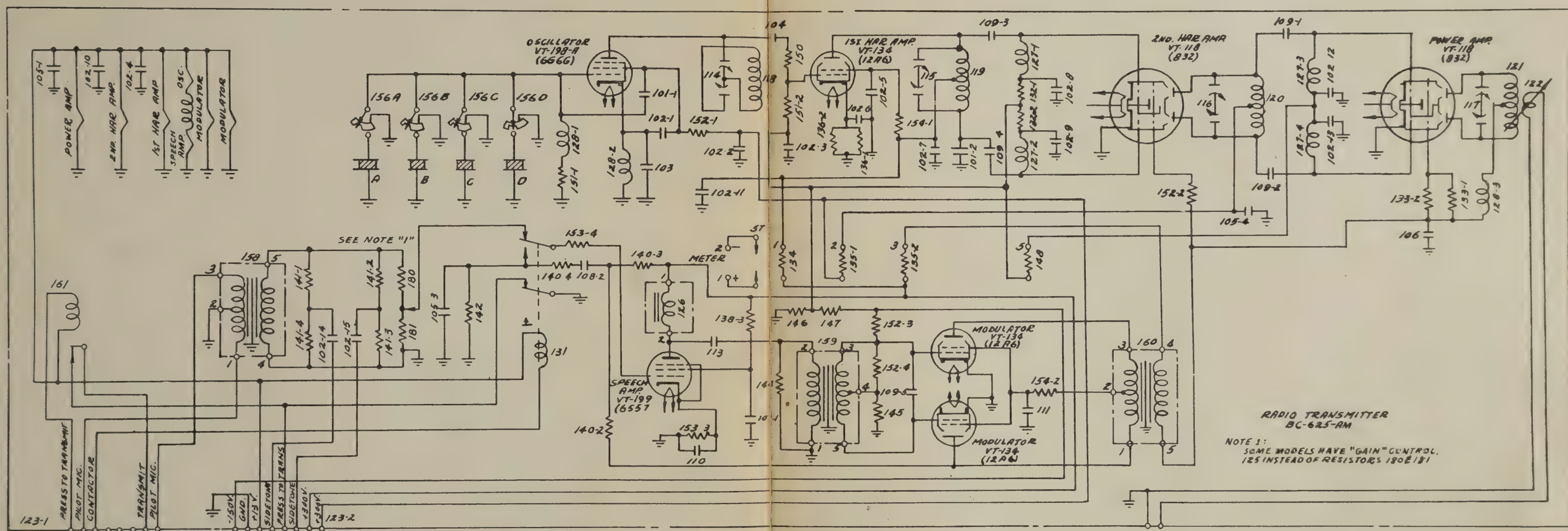


FIGURE 7-522

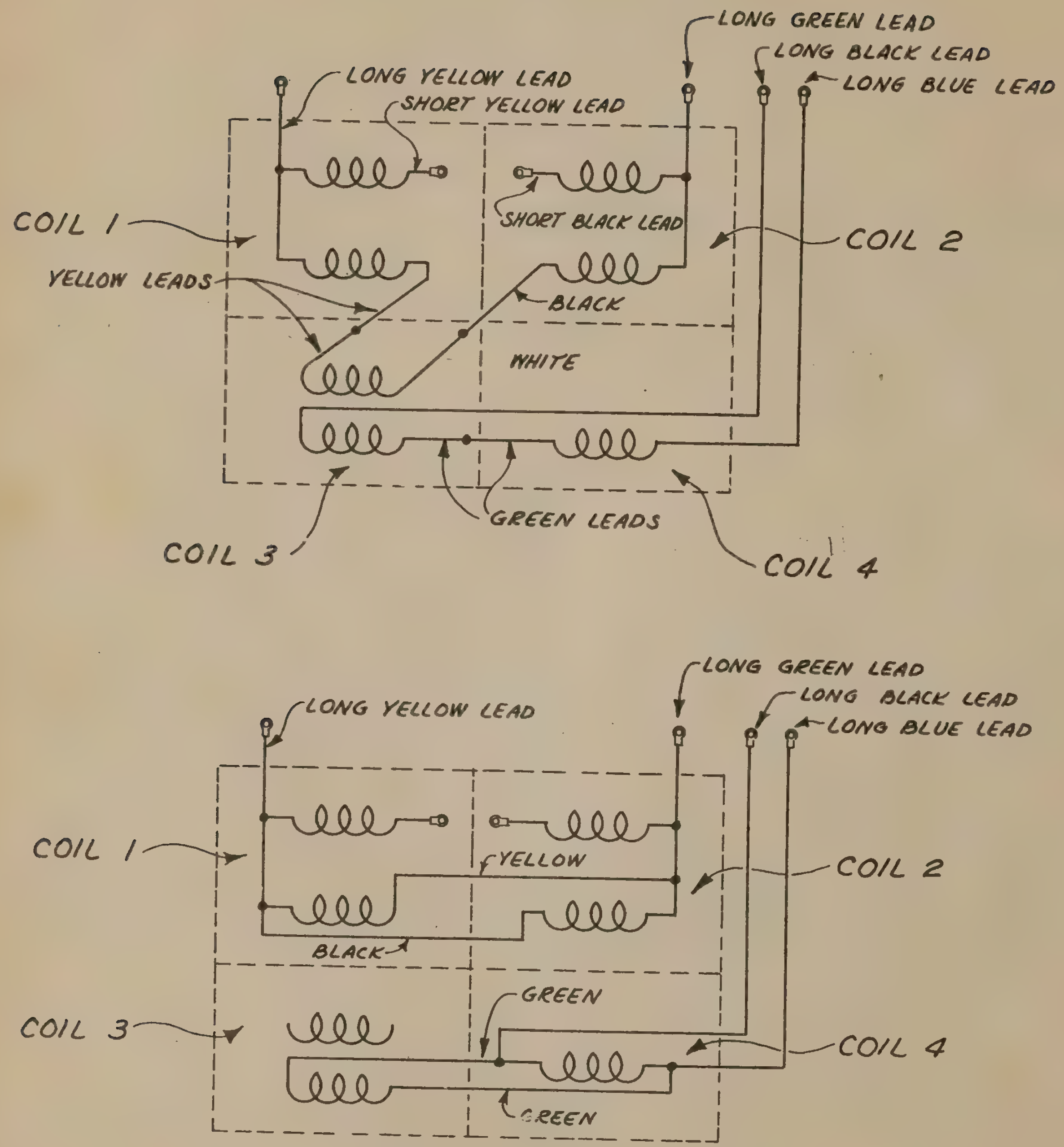

LONG GREEN LEAD
LONG BLACK LEAD
LONG YELLOW LEAD
LONG BLUE LEAD
SHORT YELLOW LEAD
COIL 1
SHORT BLACK LEAD
COIL 2
YELLOW LEADS
BLACK
WHITE
GREEN LEADS
COIL 3
COIL 4
LONG GREEN LEAD
LONG BLACK LEAD
LONG YELLOW LEAD
LONG BLUE LEAD
COIL 1
YELLOW
COIL 2
BLACK
GREEN
COIL 3
COIL 4
GREEN

FIGURE 6-522

CRYSTAL FREQUENCY CHART

	Carrier f	Crystals Receive	Crystals Trans.
	100.08	8007.27	5560.0
	100.26	8023.64	5570.0
	100.44	8040.00	5580.0
	100.62	8056.36	5590.0
	100.80	8072.73	5600.0
	100.98	8089.09	5610.0
	101.16	8105.45	5620.0
	101.34	8121.82	5630.0
	101.52	8138.18	5640.0
	101.70	8154.55	5650.0
	101.88	8170.91	5660.0
	102.06	8187.27	5670.0
	102.24	8203.64	5680.0
	102.42	8220.00	5690.0
	102.60	8236.36	5700.0
	102.78	8252.73	5710.0
F M Broadcast	102.96	8269.09	5720.0
	103.14	8285.45	5730.0
	103.32	8301.82	5740.0
	103.50	8318.18	5750.0
	103.68	8334.55	5760.0
	103.86	8350.91	5770.0
	104.04	8367.27	5780.0
	104.22	8383.64	5790.0
	104.40	8400.00	5800.0
	104.58	8416.36	5810.0
	104.76	8432.73	5820.0
	104.94	8449.09	5830.0
	105.12	8465.45	5840.0
	105.30	8481.82	5850.0
	105.48	8498.18	5860.0
	105.66	8514.55	5870.0
	105.84	8530.91	5880.0
	106.02	8547.27	5890.0
	106.20	8563.64	5900.0
	106.38	8580.00	5910.0
Facsimile	106.56	8596.36	5920.0
	106.74	8612.73	5930.0
	106.92	8629.09	5940.0
	107.10	8645.45	5950.0
	107.28	8661.82	5960.0
	107.46	8678.18	5970.0
	107.64	8694.55	5980.0
	107.82	8710.91	5990.0
	108.00	8000.00	6000.0
	108.18	8015.00	6010.0
	108.36	8030.00	6020.0
	108.54	8045.00	6030.0
	108.72	8060.00	6040.0
	108.90	8075.00	6050.0
Air Navigation (Localizer)	109.08	8090.00	6060.0
	109.26	8105.00	6070.0
	109.44	8120.00	6080.0
	109.62	8135.00	6090.0
	109.80	8150.00	6100.0
	109.98	8165.00	6110.0
	110.16	8180.00	6120.0
	110.34	8195.00	6130.0
	110.52	8210.00	6140.0
	110.70	8225.00	6150.0
	110.88	8240.00	6160.0
	111.06	8255.00	6170.0
	111.24	8270.00	6180.0
	111.42	8285.00	6190.0
	111.60	8300.00	6200.0
	111.78	8315.00	6210.0
	111.96	8330.00	6220.0
	112.14	8345.00	6230.0
	112.32	8360.00	6240.0
	112.50	8375.00	6250.0
Air Navigation (Range)	112.68	8390.00	6260.0
	112.86	8405.00	6270.0
	113.04	8420.00	6280.0
	113.22	8435.00	6290.0
	113.40	8450.00	6300.0
	113.58	8465.00	6310.0
	113.76	8480.00	6320.0

CRYSTAL FREQUENCY CHART

	Carrier f	Crystals	
		Receive	Trans.
	113.94	8495.00	6330.0
	114.12	8510.00	6340.0
	114.30	8525.00	6350.0
	114.48	8540.00	6360.0
	114.66	8555.00	6370.0
	114.84	8570.00	6380.0
	115.02	8585.00	6390.0
	115.20	8600.00	6400.0
	115.38	8615.00	6410.0
	115.56	8630.00	6420.0
	115.74	8645.00	6430.0
Air	115.92	8660.00	6440.0
Navigation	116.10	8007.69	6450.0
	116.28	8021.54	6460.0
	116.46	8035.38	6470.0
	116.64	8049.23	6480.0
	116.82	8063.08	6490.0
	117.00	8076.92	6500.0
	117.18	8090.77	6510.0
	117.36	8104.62	6520.0
	117.54	8118.46	6530.0
↑	117.72	8132.31	6540.0
	117.90	8146.15	6550.0
	118.08	8160.00	6560.0
	118.26	8173.85	6570.0
↓	118.44	8187.69	6580.0
	118.62	8201.54	6590.0
Aeronautical	118.80	8215.38	6600.0
(Airport)	118.98	8229.23	6610.0
	119.16	8243.08	6620.0
	119.34	8256.92	6630.0
	119.52	8270.77	6640.0
	119.70	8284.62	6650.0
	119.88	8298.46	6660.0
	120.06	8312.31	6670.0
	120.24	8326.15	6680.0
	120.42	8340.00	6690.0
	120.60	8353.85	6700.0
	120.78	8367.69	6710.0
	120.96	8381.54	6720.0
	121.14	8395.38	6730.0
	121.32	8409.23	6740.0
	121.50	8423.08	6750.0
	121.68	8436.92	6760.0

	Carrier f	Crystals	
		Receive	Trans.
↑	121.86	8450.77	6770.0
↓	122.04	8464.62	6780.0
	122.22	8478.46	6790.0
	122.40	8492.31	6800.0
	122.58	8506.15	6810.0
	122.76	8520.00	6820.0
	122.94	8533.85	6830.0
Aeronautical	123.12	8547.69	6840.0
(Mobile)	123.30	8561.54	6850.0
	123.48	8575.38	6860.0
	123.66	8589.23	6870.0
	123.84	8603.08	6880.0
	124.02	8001.43	6890.0
	124.20	8014.29	6900.0
	124.38	8027.14	6910.0
	124.56	8040.00	6920.0
	124.74	8052.86	6930.0
	124.92	8065.71	6940.0
	125.10	8078.57	6950.0
	125.28	8091.43	6960.0
	125.46	8104.29	6970.0
	125.64	8117.14	6980.0
	125.82	8130.00	6990.0
	126.00	8142.86	7000.0
	126.18	8155.71	7010.0
	126.36	8168.57	7020.0
	126.54	8181.43	7030.0
	126.72	8194.29	7040.0
	126.90	8207.14	7050.0
	127.08	8220.00	7060.0
	127.26	8232.86	7070.0
	127.44	8245.71	7080.0
	127.62	8258.57	7090.0
	127.80	8271.43	7100.0
	127.98	8284.29	7110.0
	128.16	8297.14	7120.0
	128.34	8310.00	7130.0
	128.52	8322.86	7140.0
	128.70	8335.71	7150.0
	128.88	8348.57	7160.0
	129.06	8361.43	7170.0
	129.24	8374.29	7180.0
	129.42	8387.14	7190.0
	129.60	8400.00	7200.0

CRYSTAL FREQUENCY CHART

	Carrier *f*	Crystals	
		Receive	Trans.
	129.78	8412.86	7210.0
	129.96	8425.71	7220.0
	130.14	8438.57	7230.0
	130.32	8451.43	7240.0
	130.50	8464.29	7250.0
	130.68	8477.14	7260.0
	130.86	8490.00	7270.0
	131.04	8502.86	7280.0
	131.22	8515.71	7290.0
	131.40	8528.57	7300.0
	131.58	8541.43	7310.0
	131.76	8554.29	7320.0
	131.94	8567.14	7330.0
	132.12	8008.00	7340.0
	132.30	8020.00	7350.0
	132.48	8032.00	7360.0
	132.66	8044.00	7370.0
	132.84	8056.00	7380.0
	133.02	8068.00	7390.0
	133.20	8080.00	7400.0
	133.38	8092.00	7410.0
	133.56	8104.00	7420.0
	133.74	8116.00	7430.0
	133.92	8128.00	7440.0
	134.10	8140.00	7450.0
Aeronautical	134.28	8152.00	7460.0
(Fixed)	134.46	8164.00	7470.0
(Government)	134.64	8176.00	7480.0
	134.82	8188.00	7490.0
	135.00	8200.00	7500.0
	135.18	8212.00	7510.0
	135.36	8224.00	7520.0
	135.54	8236.00	7530.0
	135.72	8248.00	7540.0
	135.90	8260.00	7550.0
	136.08	8272.00	7560.0
	136.26	8284.00	7570.0
	136.44	8296.00	7580.0
	136.62	8308.00	7590.0
	136.80	8320.00	7600.0
	136.98	8332.00	7610.0
	137.16	8344.00	7620.0
	137.34	8356.00	7630.0
	137.52	8368.00	7640.0

	Carrier *f*	Crystals	
		Receive	Trans.
	137.70	8380.00	7650.0
	137.88	8392.00	7660.0
	138.06	8404.00	7670.0
	138.24	8416.00	7680.0
	138.42	8428.00	7690.0
	138.60	8440.00	7700.0
	138.78	8452.00	7710.0
	138.96	8464.00	7720.0
	139.14	8476.00	7730.0
	139.32	8488.00	7740.0
	139.50	8500.00	7750.0
	139.68	8512.00	7760.0
	139.86	8524.00	7770.0
	140.04	8002.50	7780.0
	140.22	8013.75	7790.0
	140.40	8025.00	7800.0
	140.58	8036.25	7810.0
	140.76	8047.50	7820.0
	140.94	8058.75	7830.0
	141.12	8070.00	7840.0
	141.30	8081.25	7850.0
	141.48	8092.50	7860.0
	141.66	8103.75	7870.0
	141.84	8115.00	7880.0
	142.02	8126.25	7890.0
	142.20	8137.50	7900.0
	142.38	8148.75	7910.0
	142.56	8160.00	7920.0
	142.74	8171.25	7930.0
	142.92	8182.50	7940.0
	143.10	8193.75	7950.0
	143.28	8205.00	7960.0
	143.46	8216.25	7970.0
	143.64	8227.50	7980.0
	143.82	8238.75	7990.0
	144.00	8250.00	8000.0
	144.18	8261.25	8010.0
	144.36	8272.50	8020.0
	144.54	8283.75	8030.0
	144.72	8295.00	8040.0
Amateur	144.90	8306.25	8050.0
	145.08	8317.50	8060.0
	145.26	8328.75	8070.0
	145.44	8340.00	8080.0

CRYSTAL FREQUENCY CHART

	Carrier *f*	Crystals	
		Receive	*Trans.*
	145.62	8351.25	8090.0
	145.80	8362.50	8100.0
	145.98	8373.75	8110.0
	146.16	8385.00	8120.0
	146.34	8396.25	8130.0
	146.52	8407.50	8140.0
Amateur	146.70	8418.75	8150.0
	146.88	8430.00	8160.0
	147.06	8441.25	8170.0
	147.24	8452.50	8180.0
	147.42	8463.75	8190.0
	147.60	8475.00	8200.0
	147.78	8486.25	8210.0
↑	147.96	8497.50	8220.0
↓	148.14	8008.24	8230.0
	148.32	8018.82	8240.0
	148.50	8029.41	8250.0
	148.68	8040.00	8260.0
Government	148.86	8050.59	8270.0
	149.04	8061.18	8280.0
(Fixed)	149.22	8071.76	8290.0
(Aero)	149.40	8082.35	8300.0
	149.58	8092.94	8310.0
	149.76	8103.53	8320.0
	149.94	8114.12	8330.0
	150.12	8124.71	8340.0
	150.30	8135.29	8350.0
	150.48	8145.88	8360.0
	150.66	8156.47	8370.0
	150.84	8167.06	8380.0
	151.02	8177.65	8390.0
	151.20	8188.24	8400.0
	151.38	8198.82	8410.0
	151.56	8209.41	8420.0
	151.74	8220.00	8430.0
↑	151.92	8230.59	8440.0
↓	152.10	8241.18	8450.0
	152.28	8251.76	8460.0
	152.46	8262.35	8470.0
	152.64	8272.94	8480.0
Railroad.	152.82	8283.53	8490.0
Press Relay.	153.00	8294.12	8500.0
	153.18	8304.71	8510.0
Urban Telephone.	153.36	8315.29	8520.0
Police.	153.54	8325.88	8530.0
Fire	153.72	8336.47	8540.0
Maritime	153.90	8347.06	8550.0
Geophysical	154.08	8357.65	8560.0
	154.26	8368.24	8570.0
Experi-mental.	154.44	8378.82	8580.0
	154.62	8389.41	8590.0
	154.80	8400.00	8600.0
	154.98	8410.59	8610.0
	155.16	8421.18	8620.0
	155.34	8431.76	8630.0
	155.52	8442.35	8640.0
	155.70	8452.94	8650.0
	155.88	8463.53	8660.0

MODIFICATIONS OF MAJOR ASSEMBLIES OF RADIO SET SCR-522-A

Previous Model Number	*Latest Model Number*	*Modification*
Radio Transmitter BC-625-A	Radio Transmitter BC-625-A (modified)	1. R.F. indicator diode removed; filament circuits rewired.
Radio Transmitter BC-625-A	Radio Transmitter BC-625-AM	1. Slow release relay, 130, removed.
Radio Receiver BC-624-A	Radio Receiver BC-624-AM	1. Field modified to include tube JAN-12H6, noise suppressor and AVC delay. 2. Factory modified to include tube JAN-12H6, noise suppressor and AVC delay.
	BC-624-C	1. Tube JAN-12AH7GT added as first audio and AVC delay. 2. Squelch audio tube JAN-12AH7GT now furnishes squelch bias to the grid of the first audio tube JAN-12AH7GT instead of operating the squelch relay. 3. Third audio tube JAN-12A6 added. 4. Tube JAN-12C8 changed to AVC and second audio circuit. 5. New output transformer added.

CHANGEOVER TO 110 VAC POWER SUPPLY INSTRUCTIONS FOR BC-348-E-M-O-P-S SERIES USE SCHEMATICS 1, 2 AND 3

1. Lift the center lead from resistor 501 A-B and connect to lead coming from dynamotor terminal 3.
2. Run a lead from ground lug to pin 1 of tube A
3. Run lead from pin 7 of C to pin 7 of B.
4. Lift lead from pin 2 of C and solder to pin 7 of C.
5. Solder pin 1 and 2 of C together.
6. Place a jumper between pins 1 and 2 of tube B.
   Now go to the R. F. shelf and using Schematic 3
7. Place a jumper between pin 2 and 1 of tube D.
8. Place jumper between pins 1 and 2 of tube F and snip out the old lead attached to pin 2 of tube F.
9. Run jumper between pin 7 of D and pin 7 of E.
10. Lift lead from contact 1 of switch 107, section 1, front. Solder to pin 7 of tube C.
11. Put a jumper across resistor 503 which is behind the front panel of the receiver. Take off the dial cover and change the dia lights wiring from series to parallel.

BC-348-J-Q-N USE SCHEMATICS 4 AND 5

1. Snip out resistor 84 which connects pin 2 of socket D to pin 1 of the terminal board. Connect pin 1 to pin 2.
2. Run a lead from pin 7 of socket D to the terminal board pin that resistor 84 was taken from.
3. Put jumper from pin 7 socket C to pin 7 socket B.
4. Solder jumper between pin 8 and pin 1 of socket B.
5. Run lead from pin 1 to pin 3 of terminal board 126.
6. Run a lead from pin 2 of socket E to pin 7 of socket F and pin 7 of socket G, first removing the leads originally on these last two.
7. Connect pin 7 to pin 8 of socket E.
8. Connect pin 2 of socket F to ground lug just below it.
9. Trace down and snip off the block lead from the dial light to the AVC-OFF-MC switch 169. Solder lead removed from switch to pin 7 of socket B.
10. Change the dial lights to parallel in place of the series wiring they now have and short out the sixty ohm resistor in series with the dimmer control.

Diagram 6 is included to show proper connections for 110 VAC operation. The power pack is built on the dynamotor mounting base after it has been completely stripped of its original parts complement. A few of the power transformers that will fit into the small space are listed on the drawing. On testing the power pack make sure the plate voltage is not over 300 volts or so. If the voltage is too high remove the input condensor. No attempt to list the numbers of chokes has been made, for the amateurs junk box usually contains a small one that will do. Use a GT tube if possible to conserve space.

Notice that the B- is put into the receiver through a filter choke. Don't make this connection to ground. Be careful that the dial lights are fed from the 6 VAC filament source. If left on the on-off switch it will short the 115 VAC.

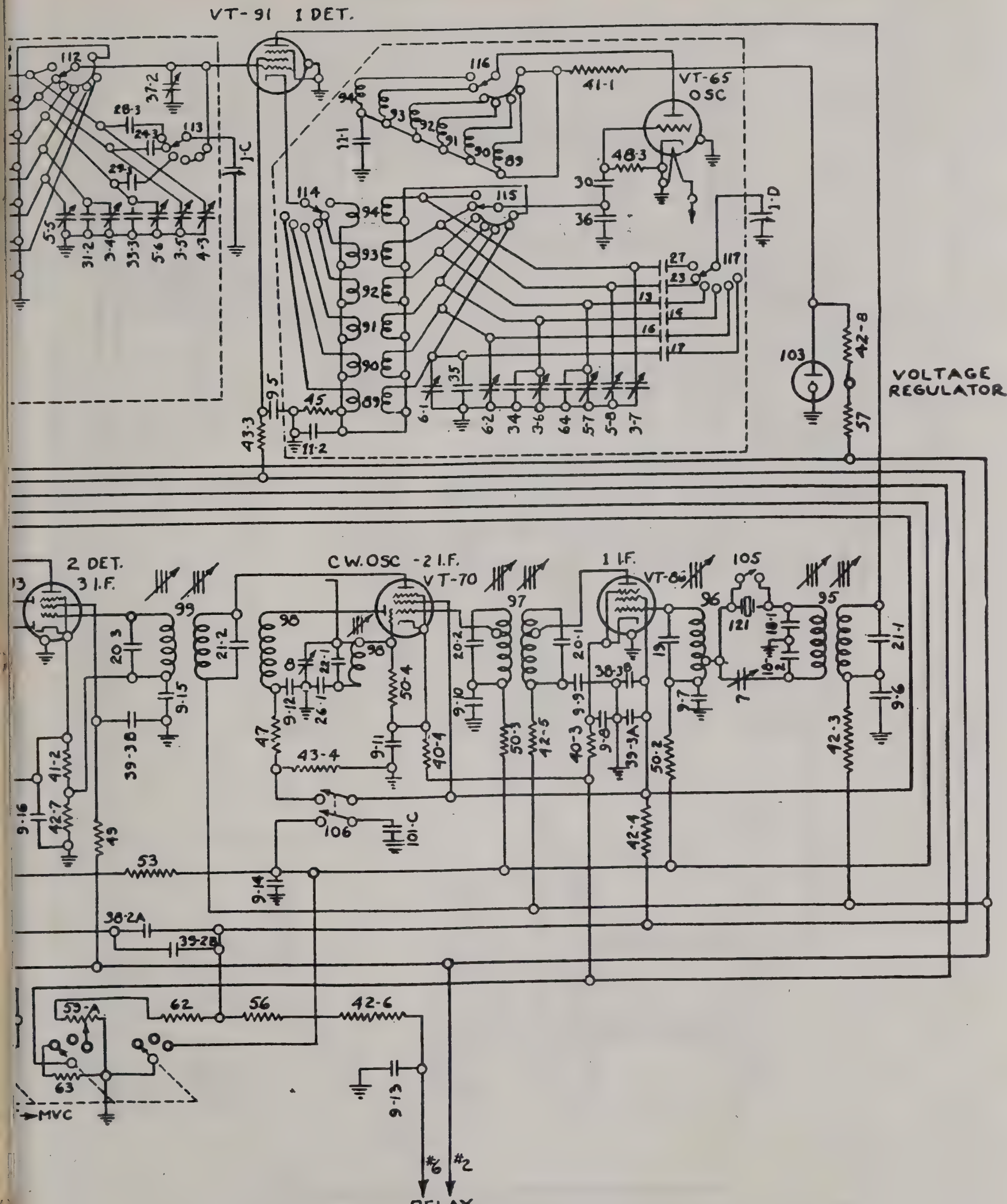


FIGURE 1-348

Radio Receiver BC-348-E, BC-348-M or BC-348-P, Schematic Circuit Diagram

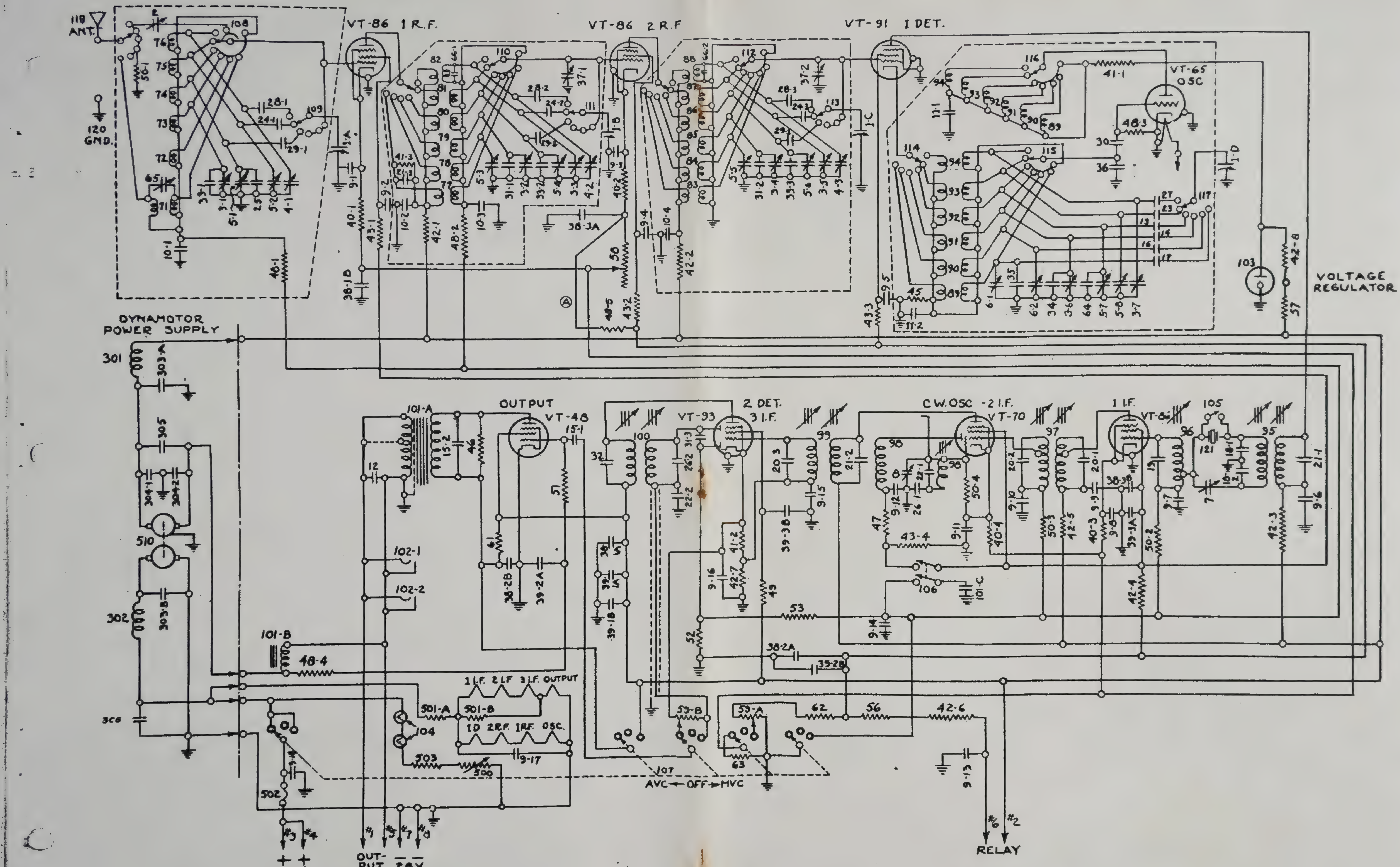


FIGURE 1 -348

Radio Receiver BC-348-E, BC-348-M or BC-348-P, Schematic Circuit Diagram

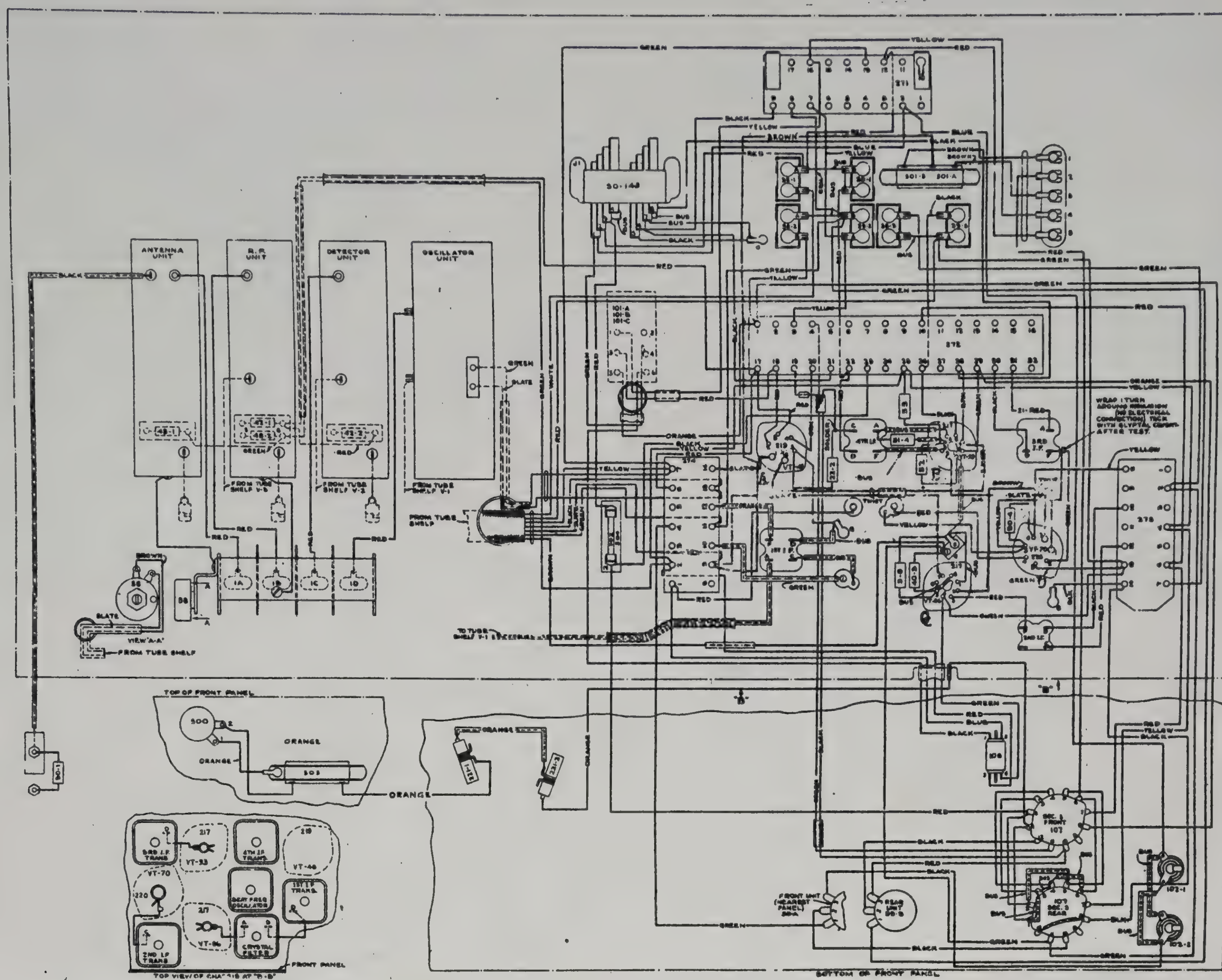


FIGURE 2-348

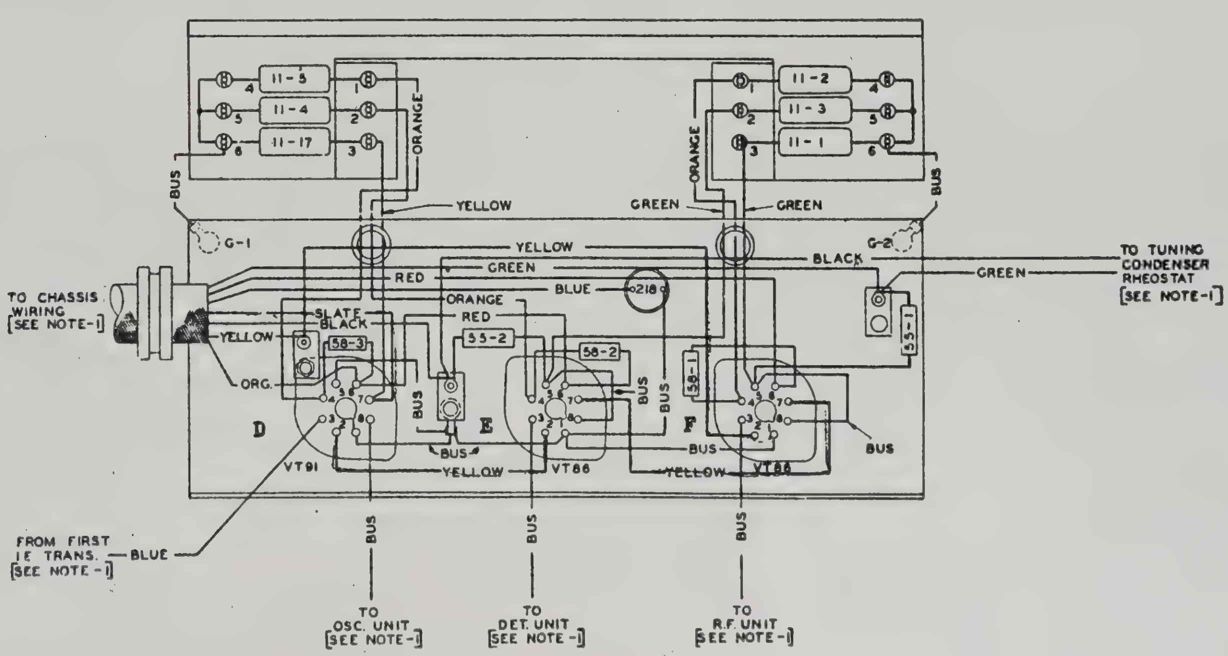


FIGURE 3 -348

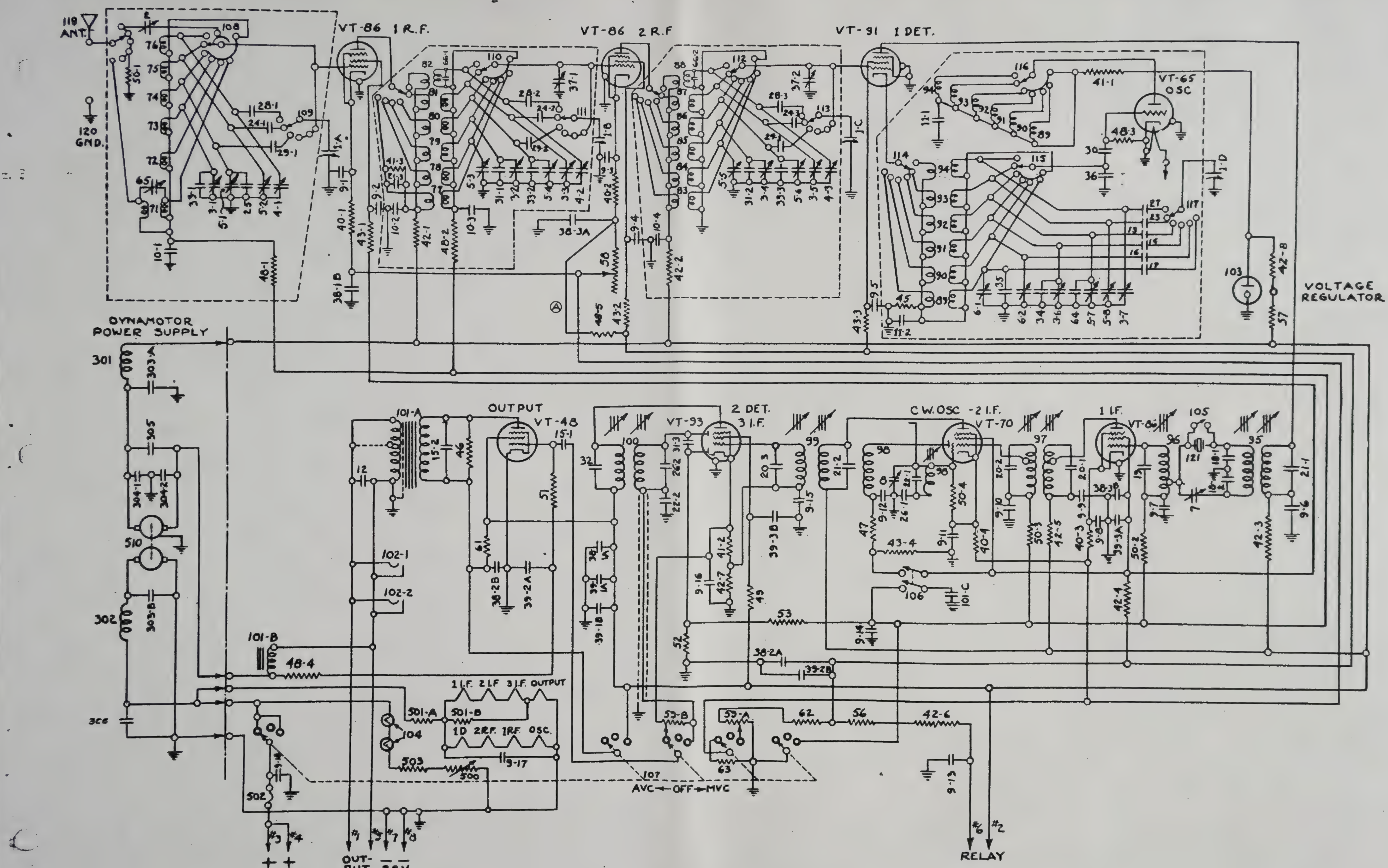


FIGURE 1 -348

Radio Receiver BC-348-E, BC-348-M or BC-348-P, Schematic Circuit Diagram

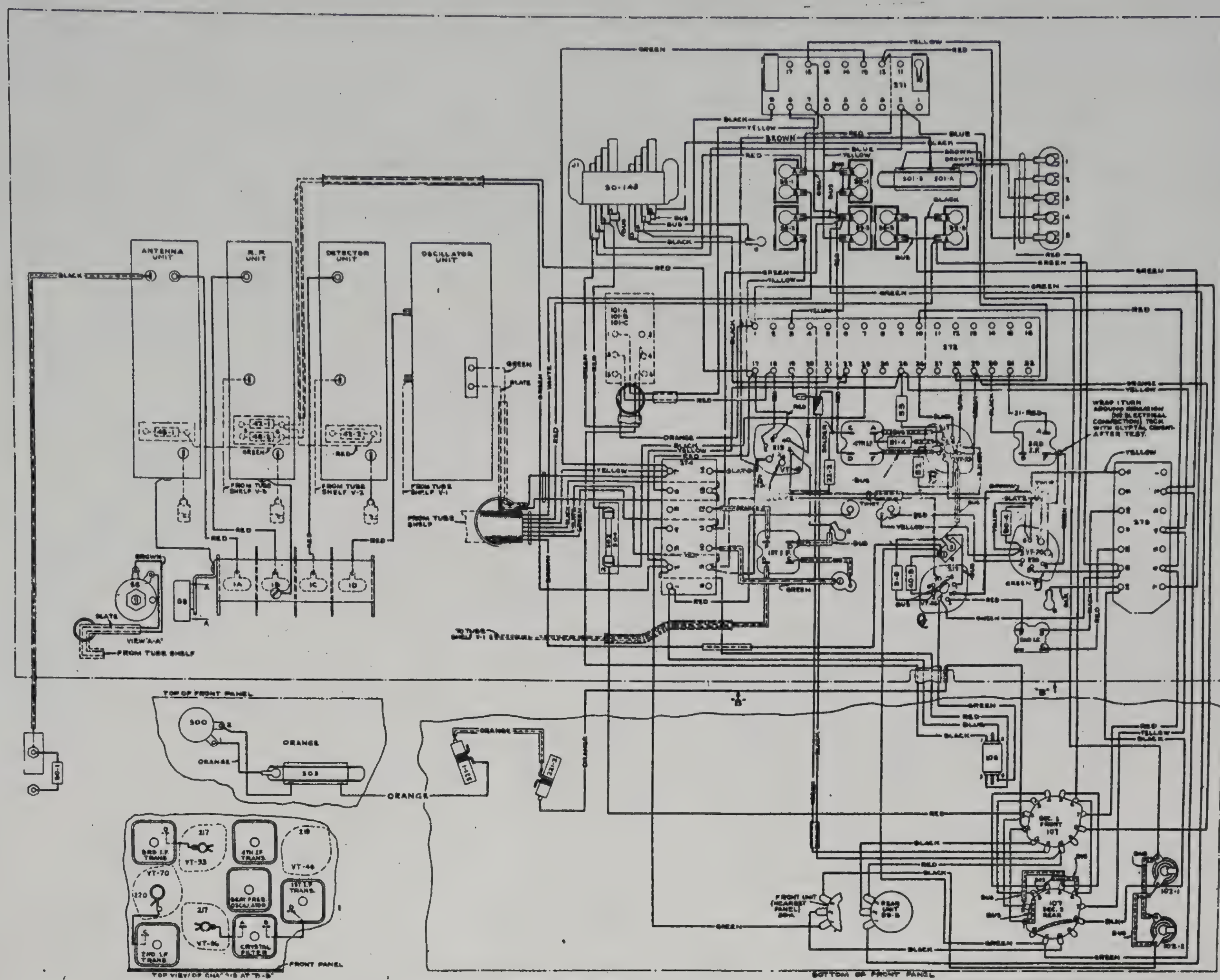


FIGURE 2-348

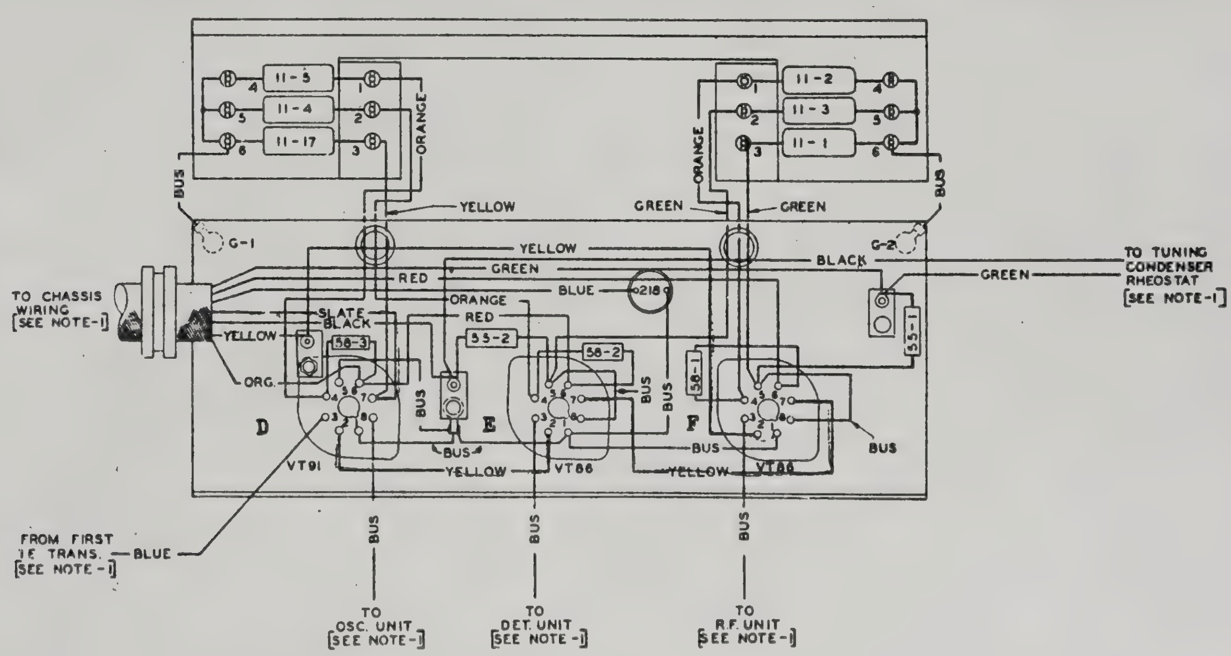


FIGURE 3 -348

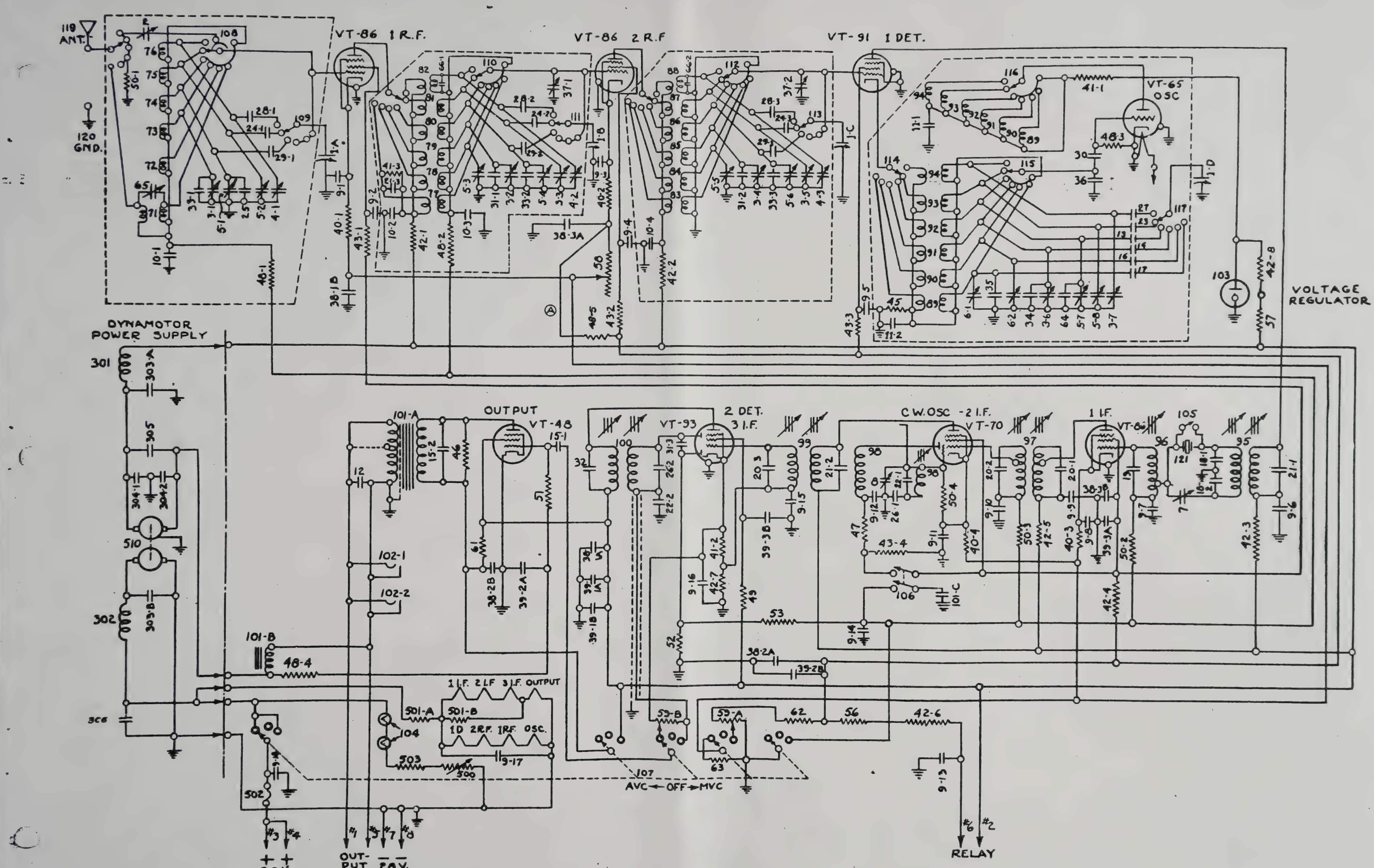


FIGURE 1-348

Radio Receiver BC-348-E, BC-348-M or BC-348-P, Schematic Circuit Diagram

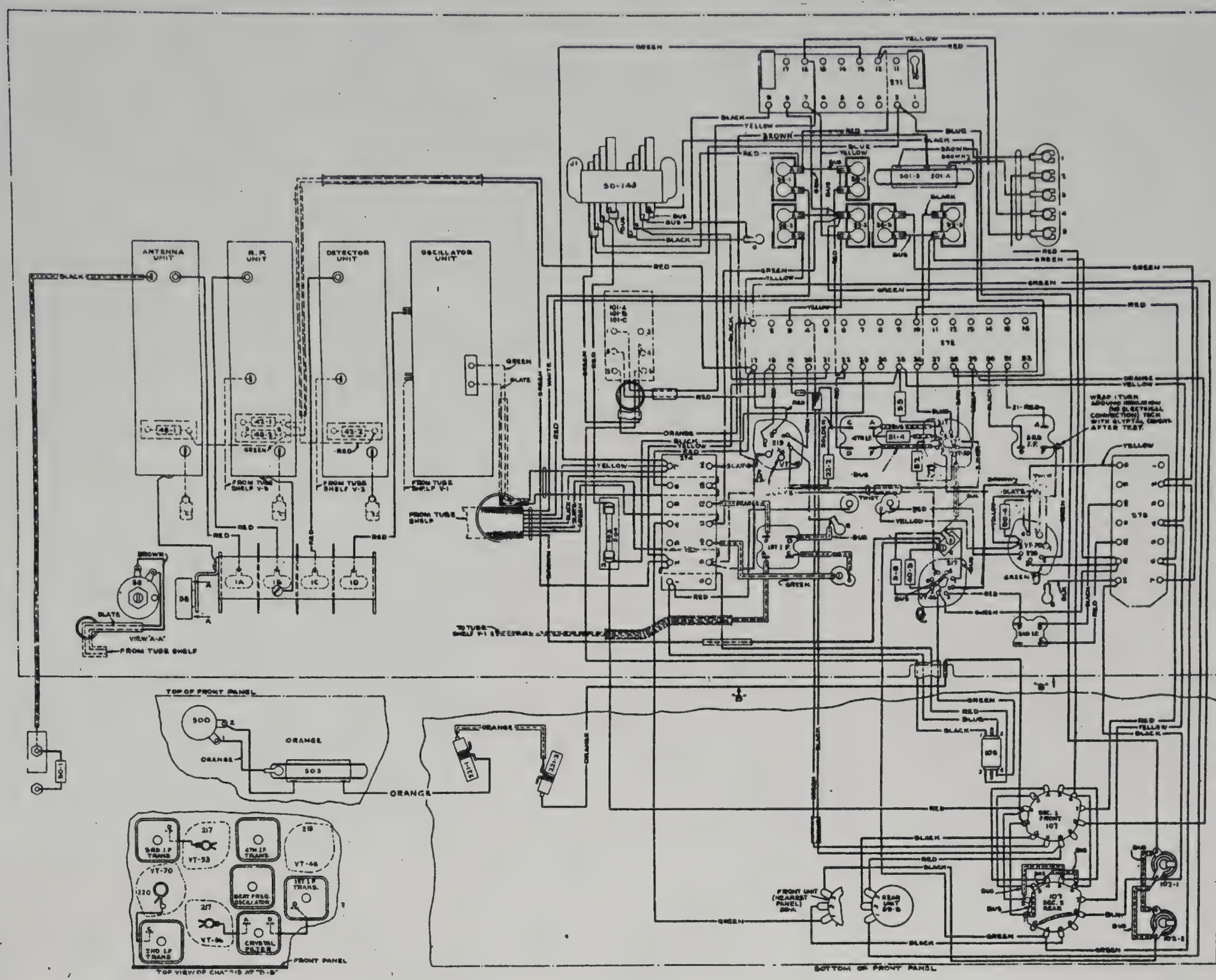


FIGURE 2-348

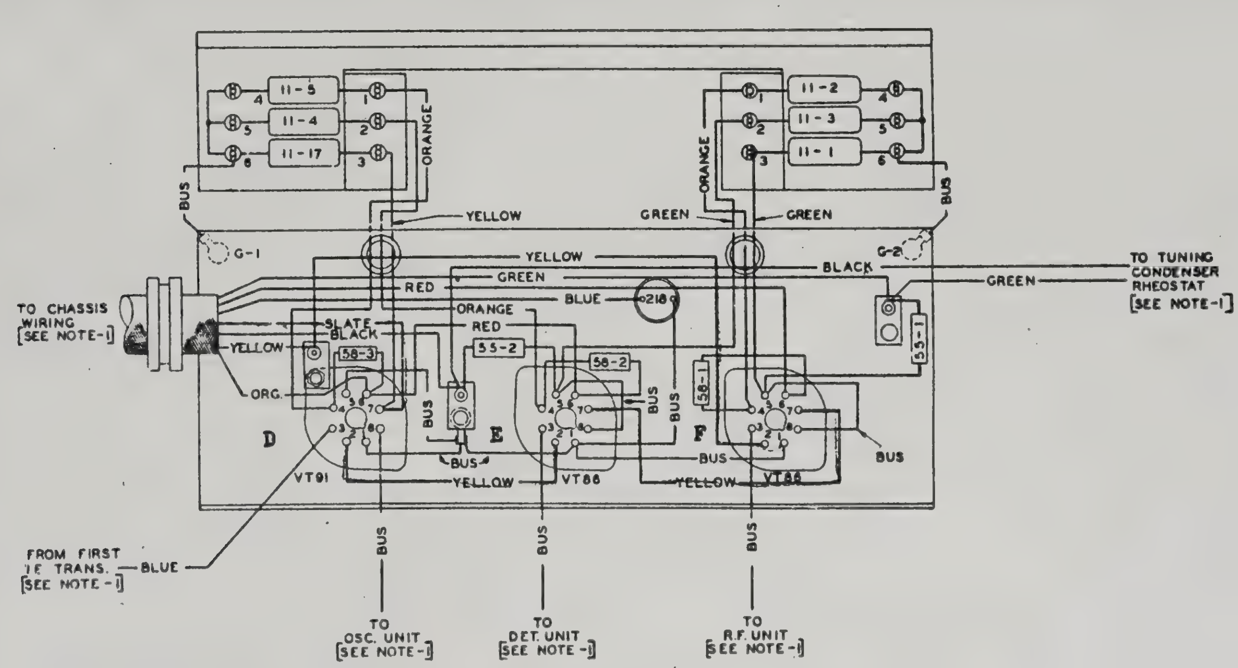


FIGURE 3 -348

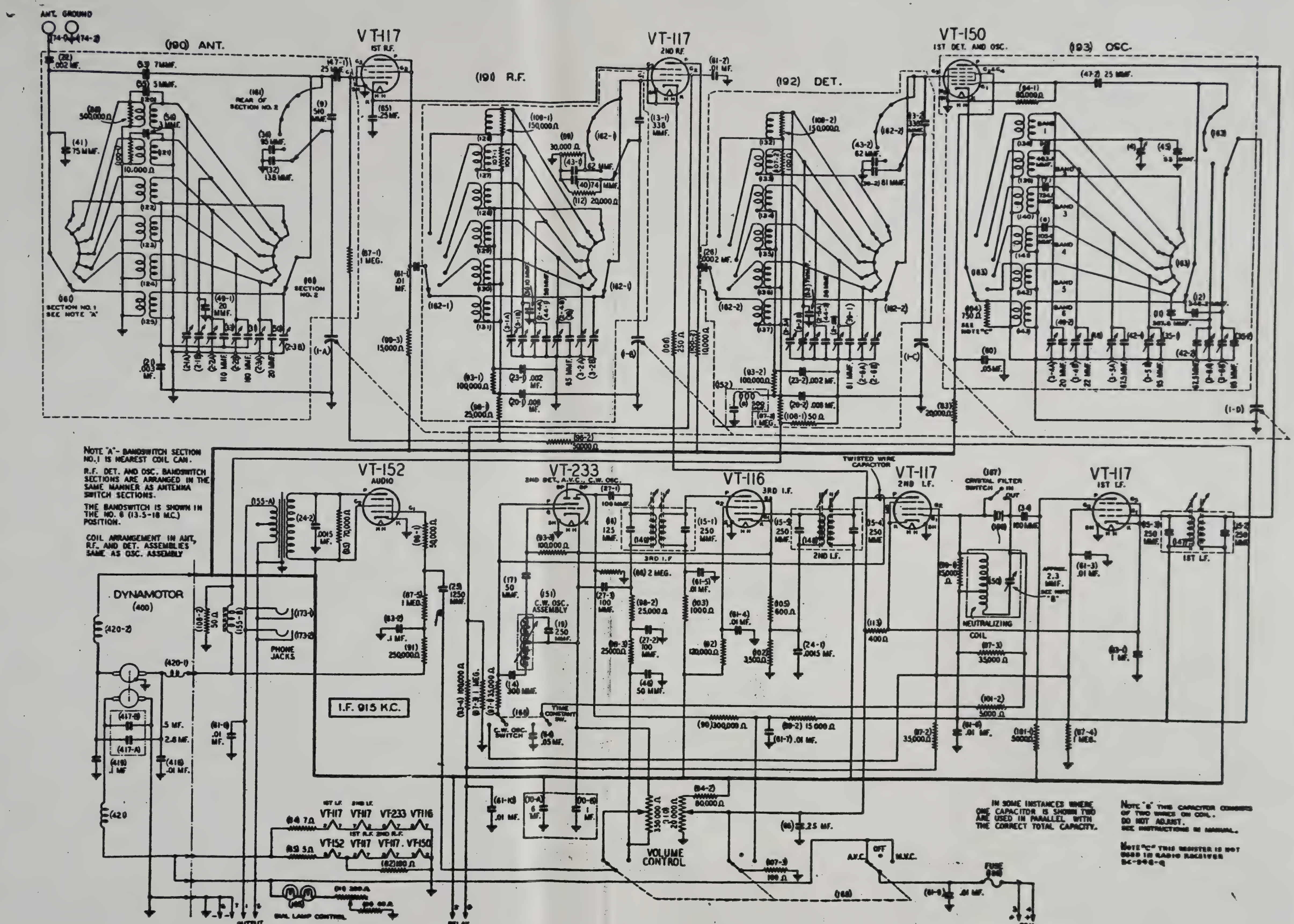


FIGURE 4-348

Radio Receiver BC-348-J, Schematic Diagram

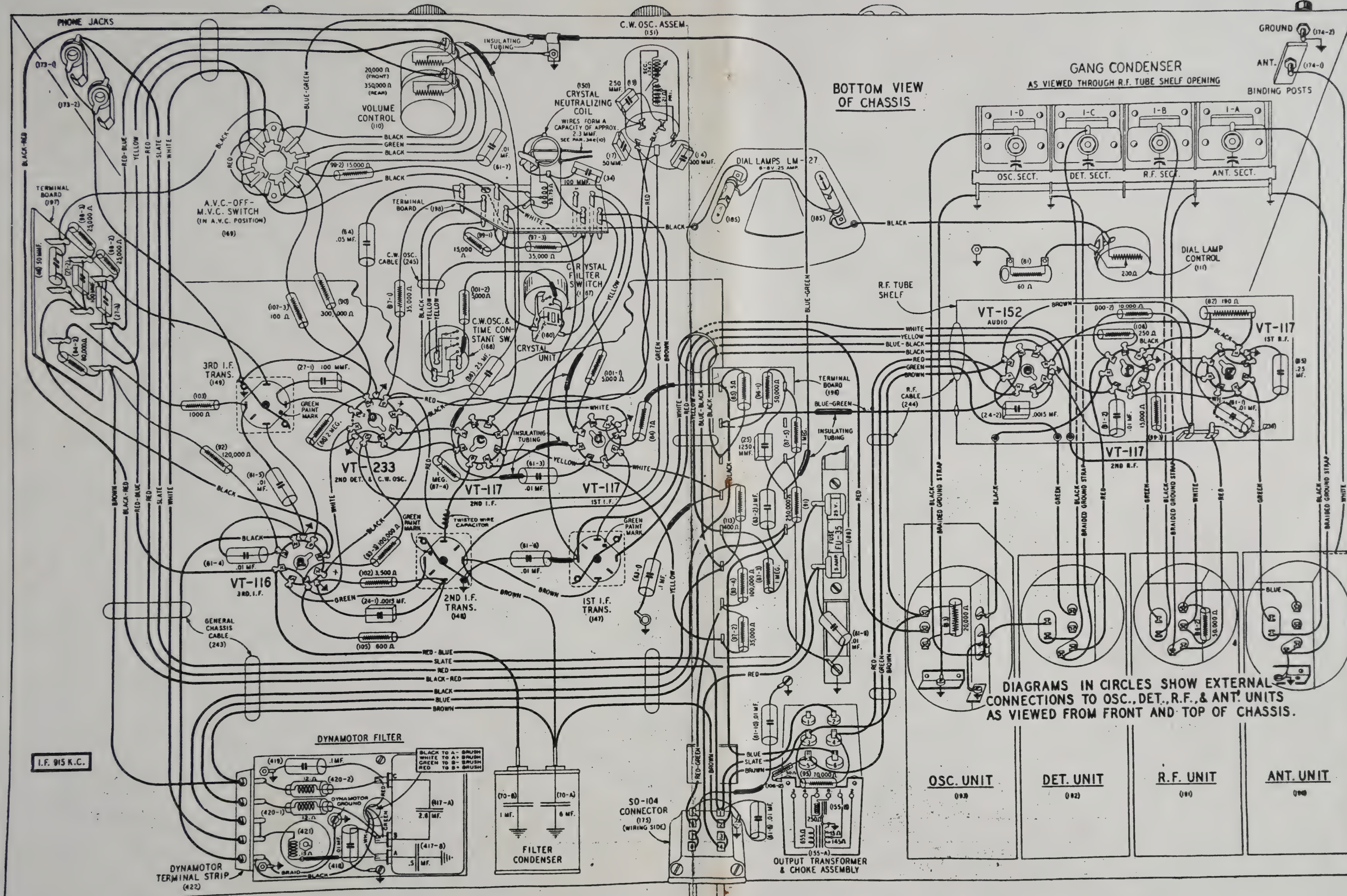


FIGURE 5-348.
Radio Receiver BC-348-J, Wiring Diagram of Chassis

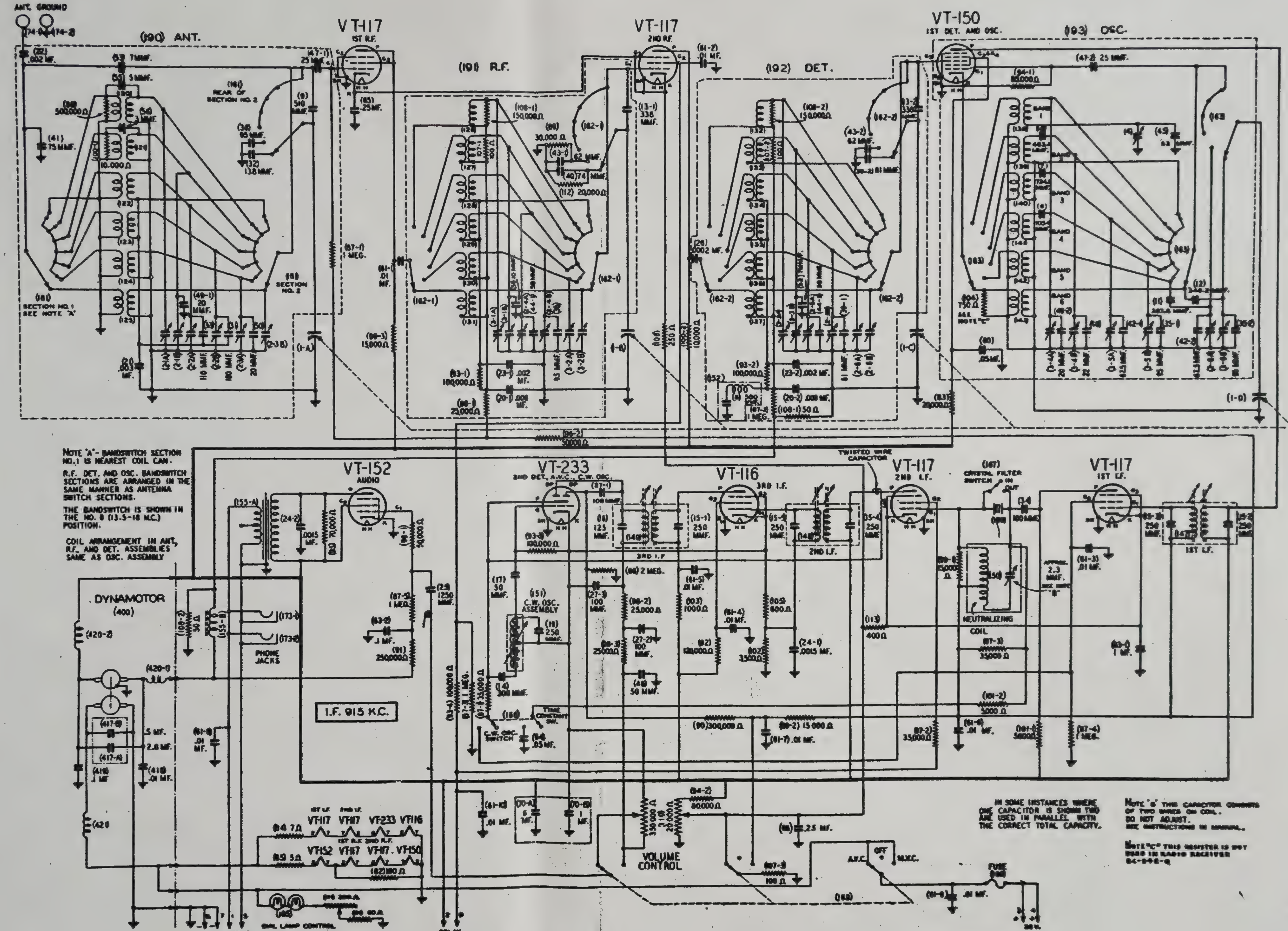


FIGURE 4-348

Radio Receiver BC-348-J, Schematic Diagram

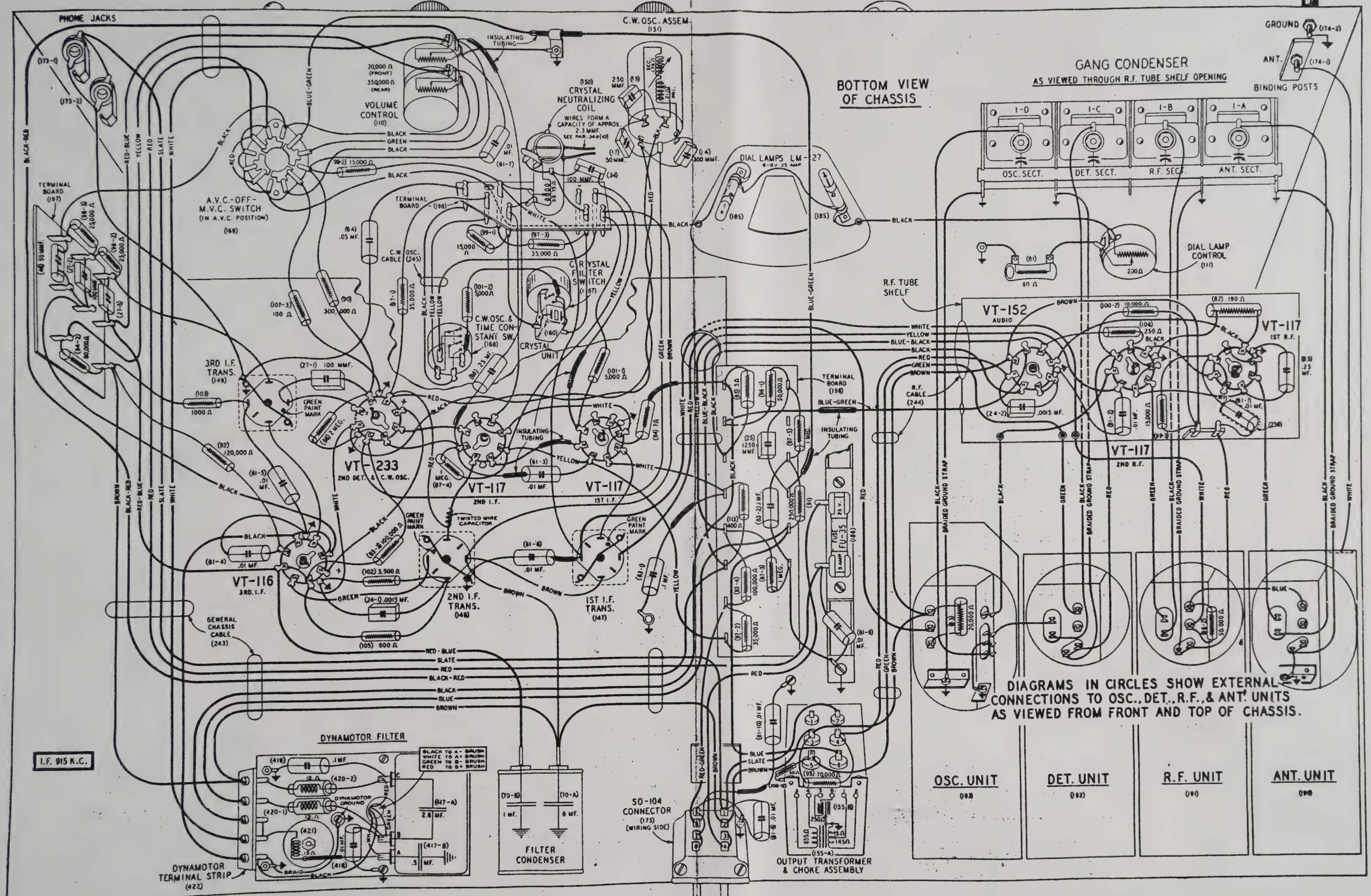


FIGURE 5-348
Radio Receiver BC-348-J, Wiring Diagram of Chassis

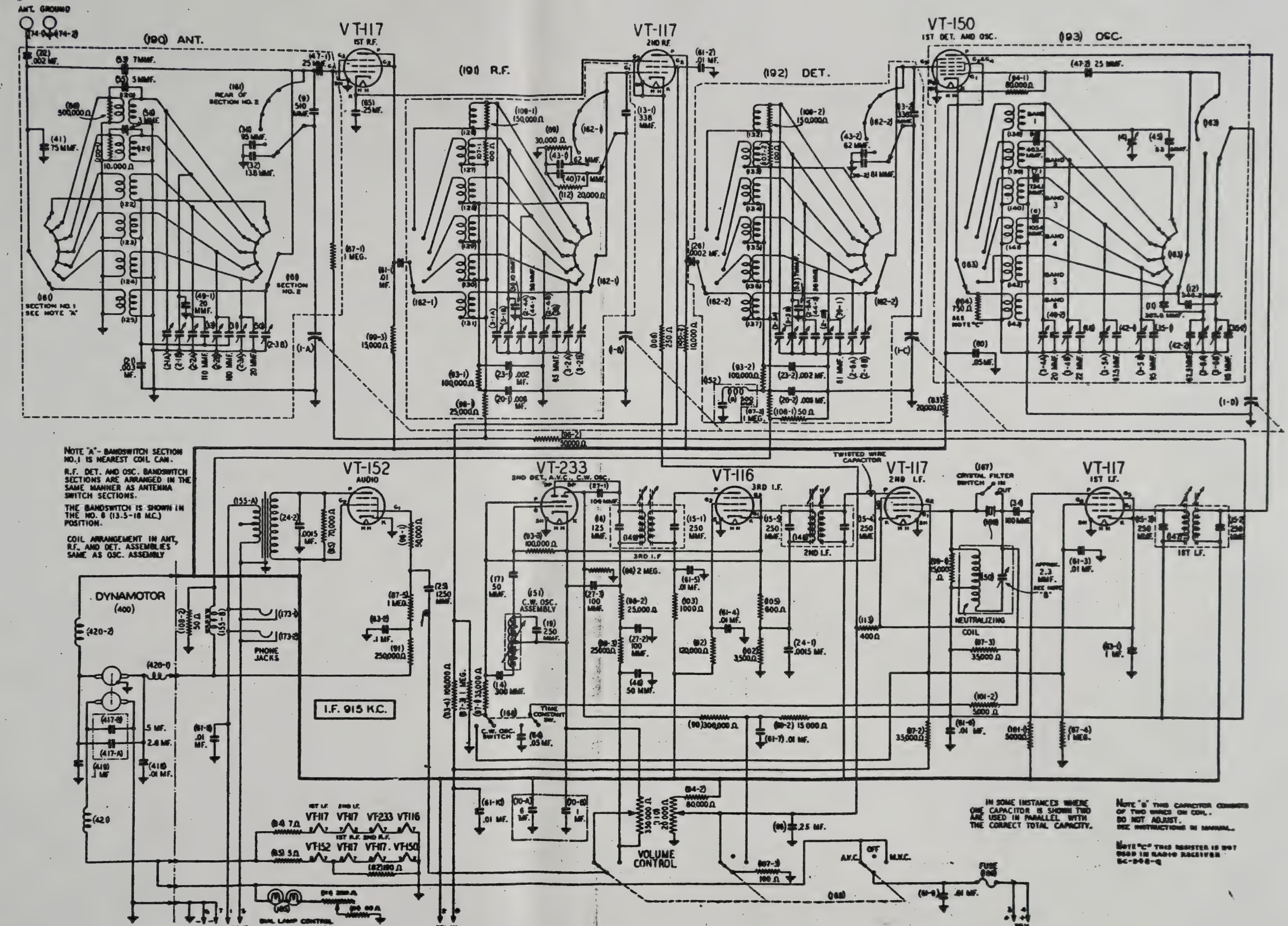


FIGURE 4-348

Radio Receiver BC-348-J, Schematic Diagram

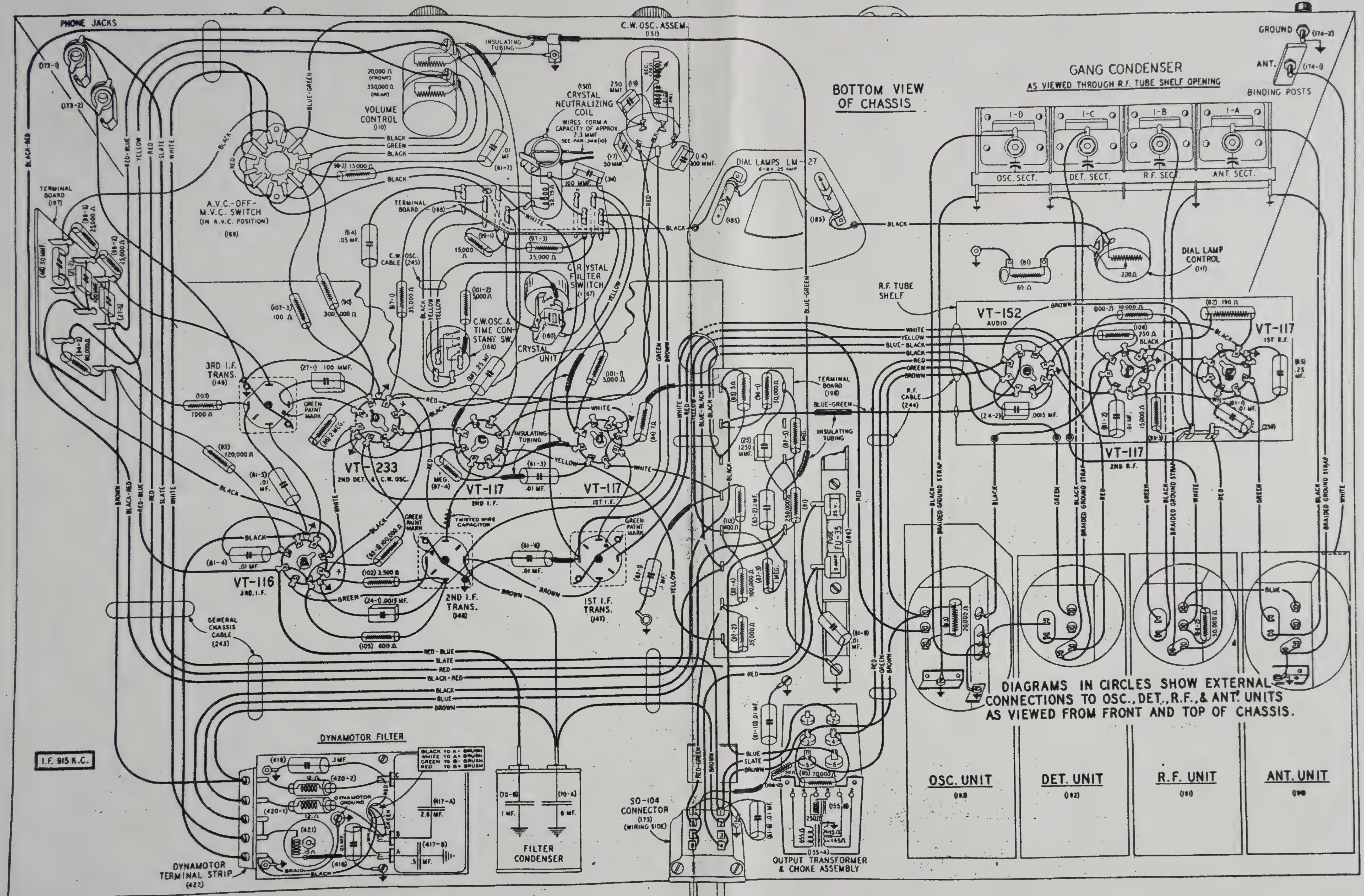


FIGURE 5 -348
Radio Receiver BC-348-J, Wiring Diagram of Chassis

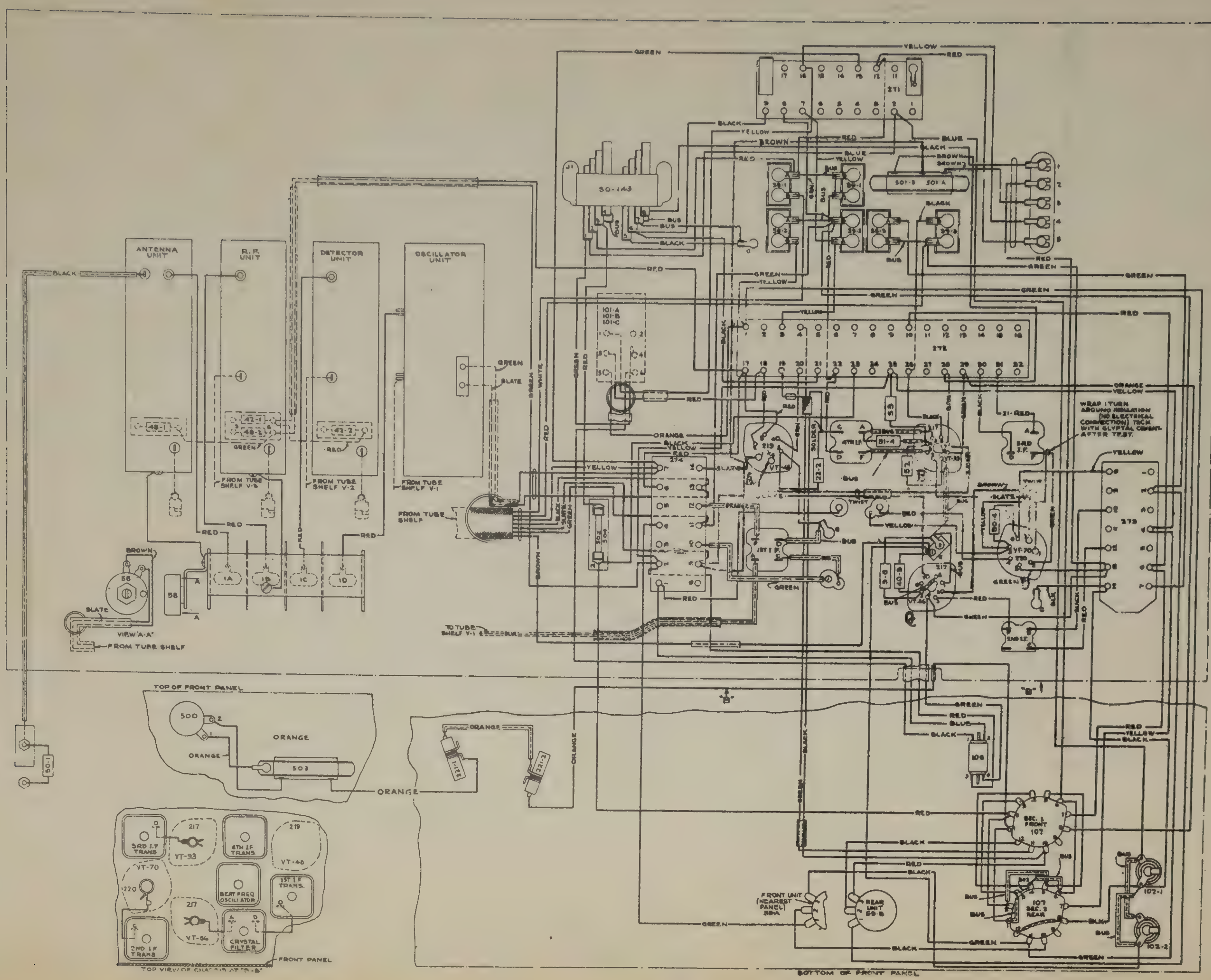


FIGURE 2-348

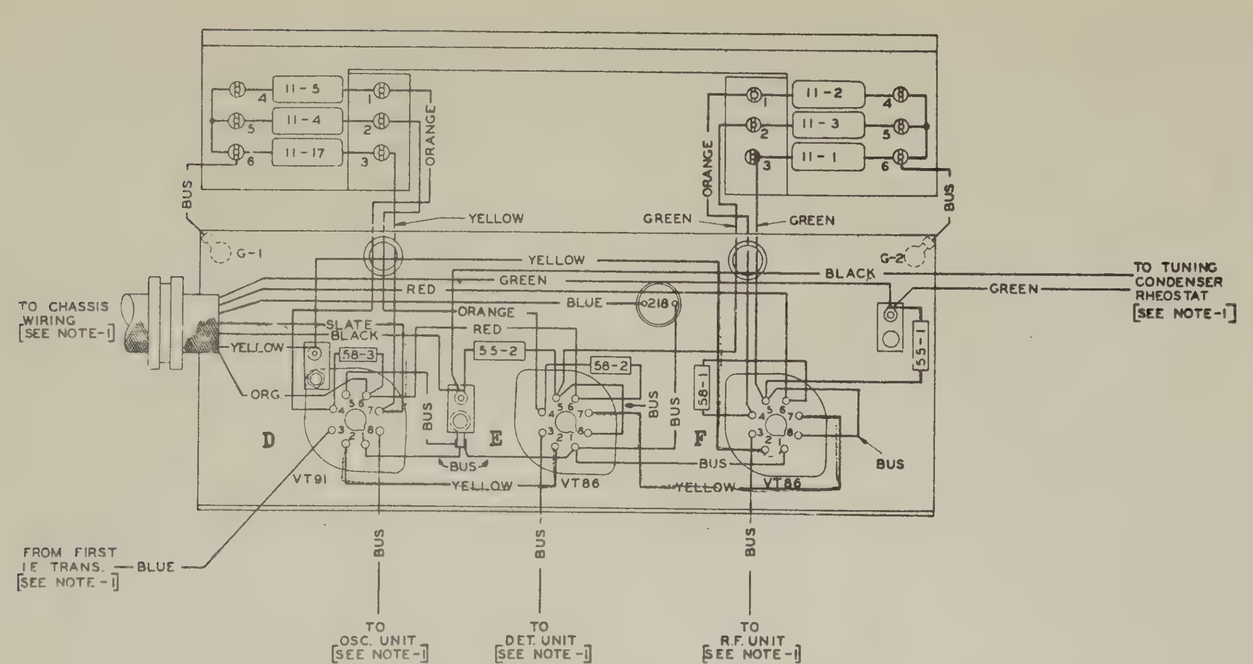


FIGURE 3 -348

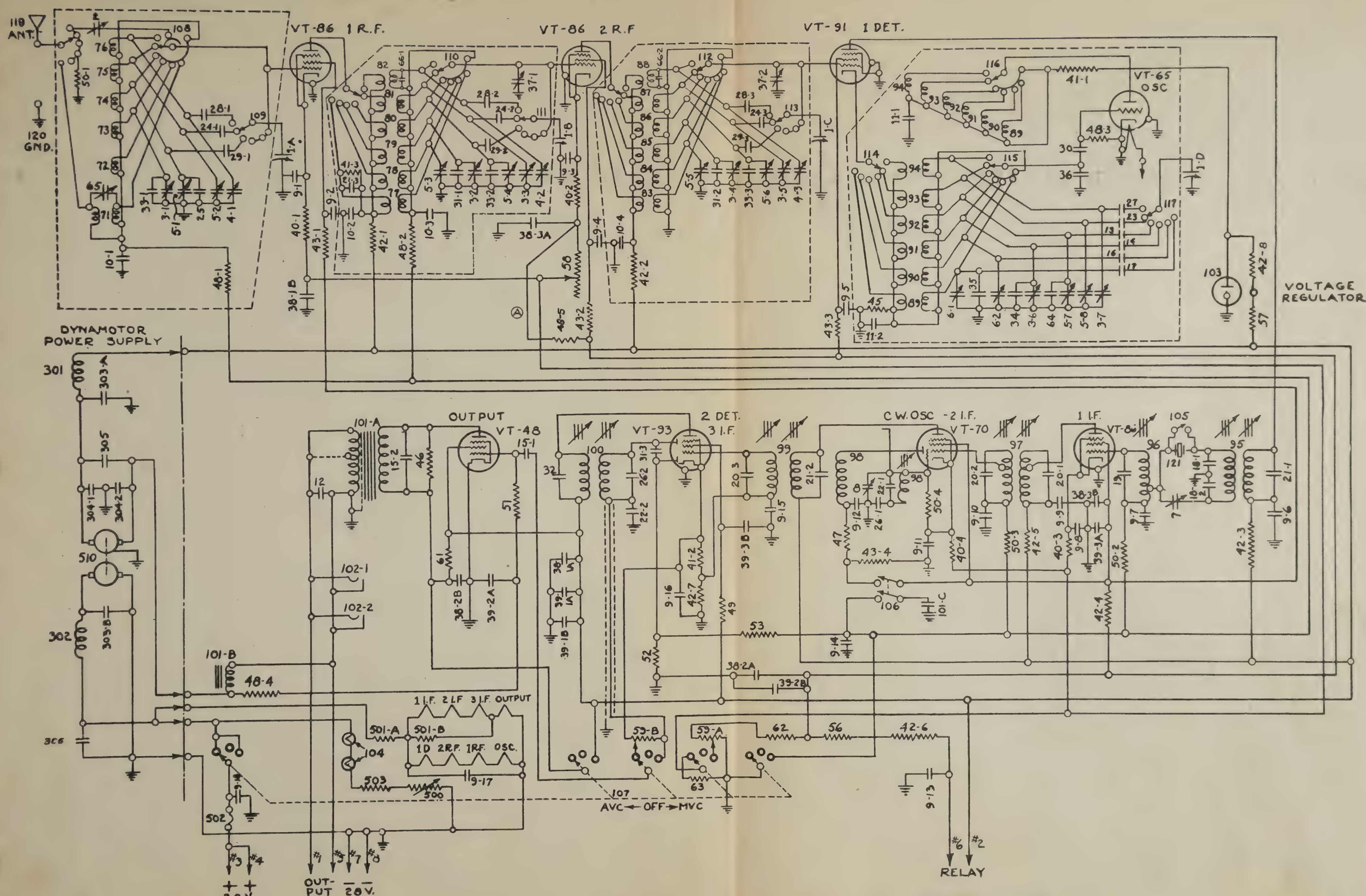


FIGURE 1-348

Radio Receiver BC-348-E, BC-348-M or BC-348-P, Schematic Circuit Diagram

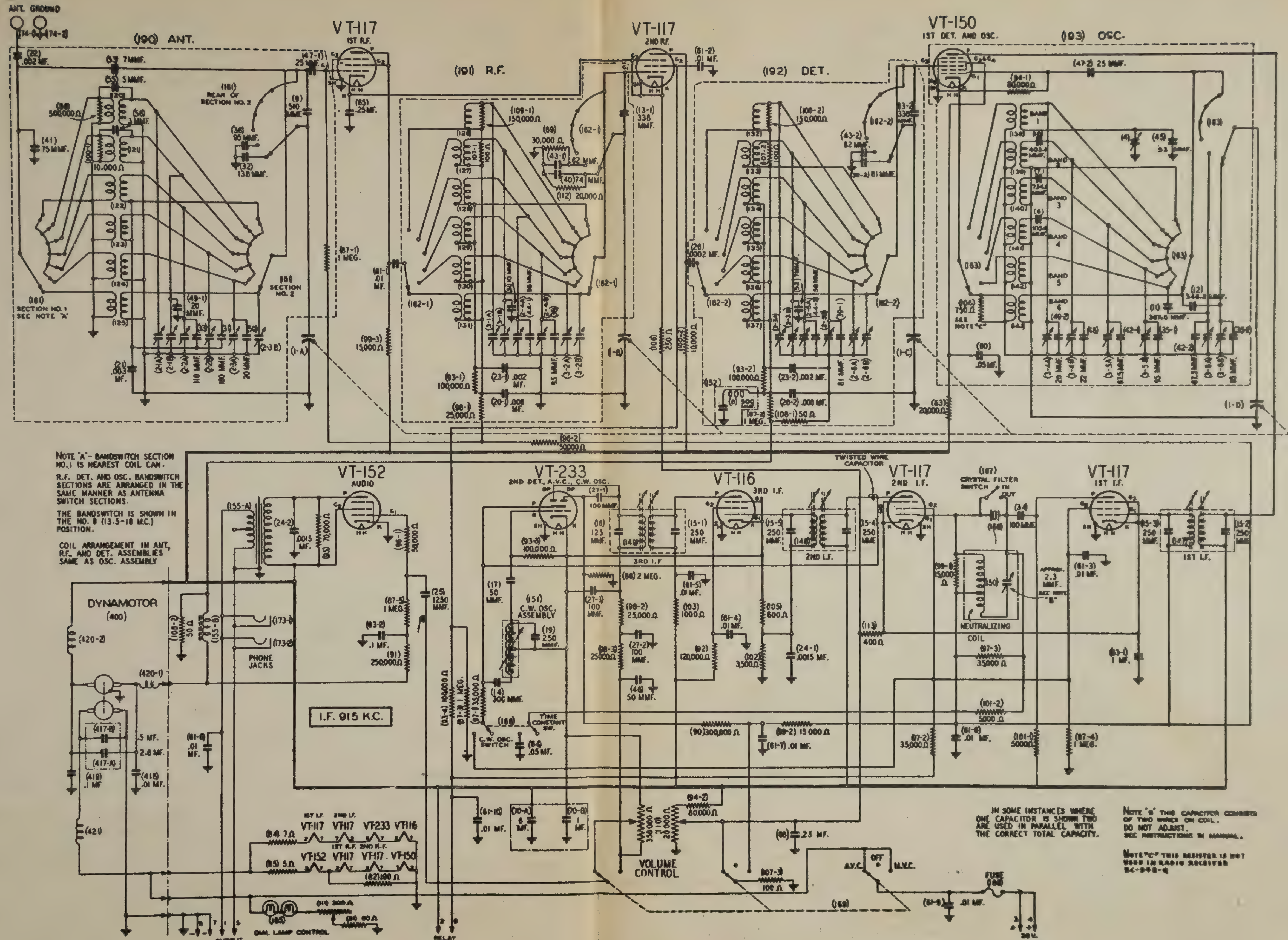


FIGURE 4-348

Radio Receiver BC-348-J, Schematic Diagram

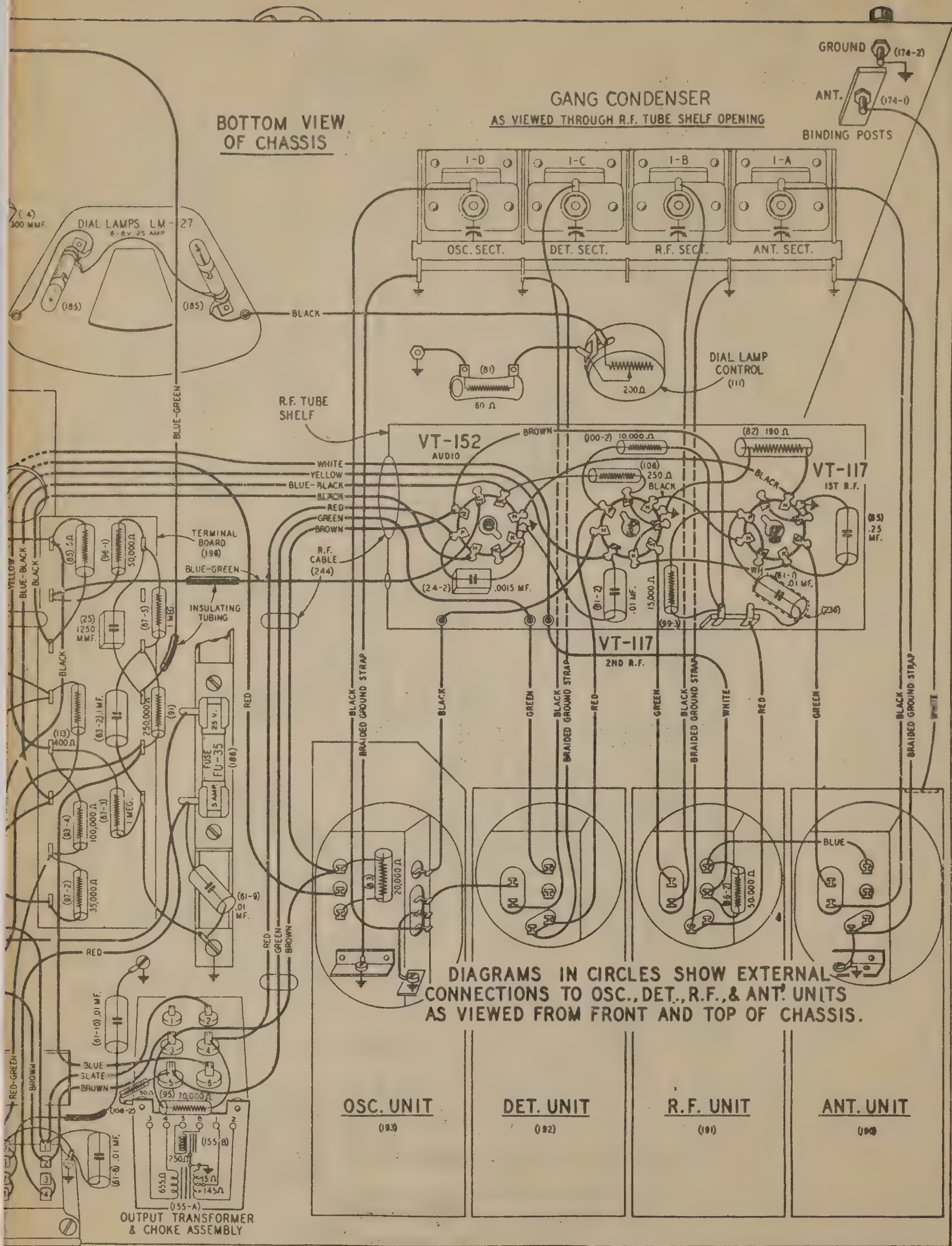
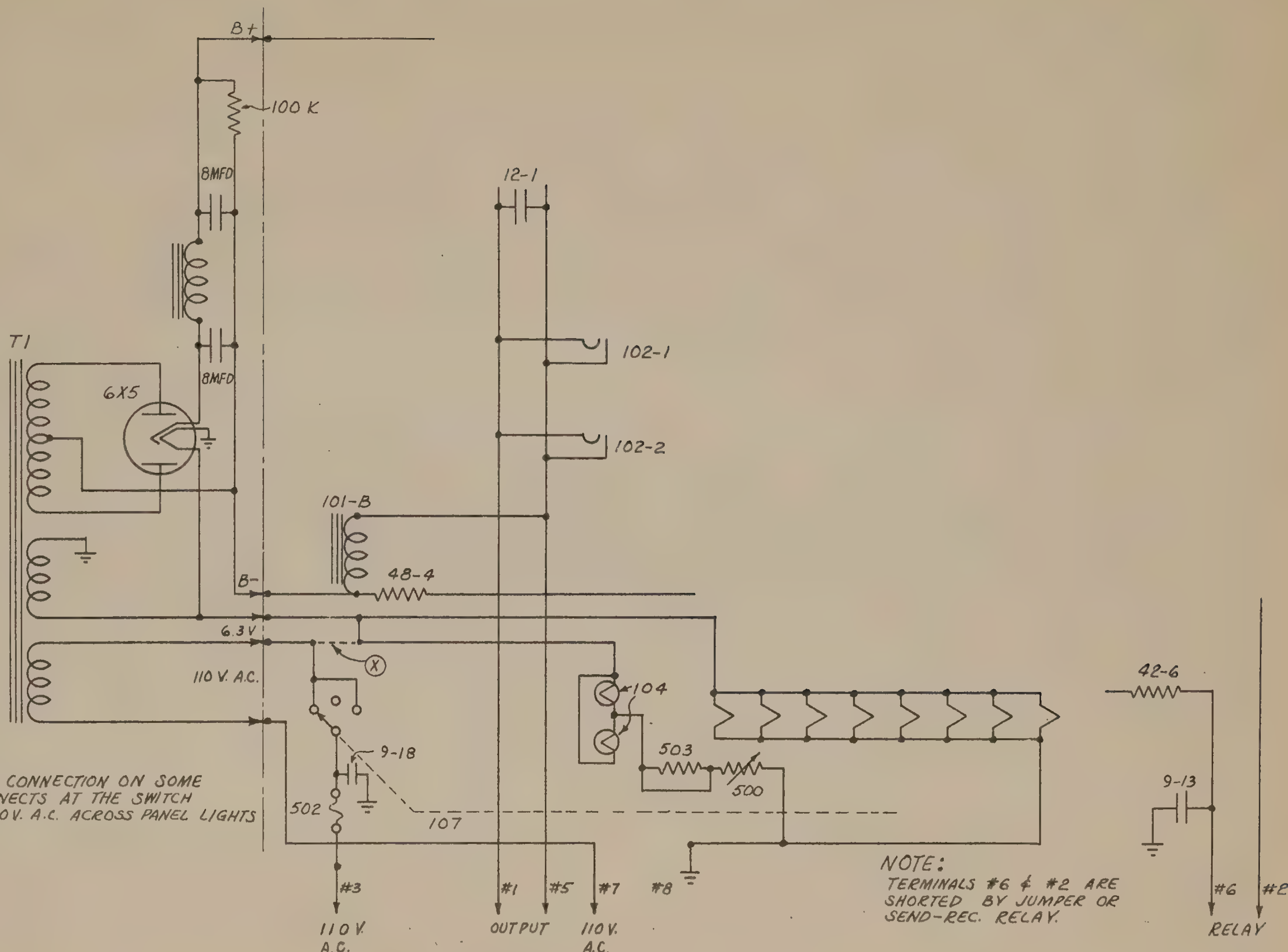


FIGURE 5 -348

Radio Receiver BC-348-J, Wiring Diagram of Chassis

NOTE:
T1 MAY BE ANY OF THE FOLLOWING: STANCOR P6120
THORDARSON 17R36
THORDARSON 70R78
UTC R2
UTAH Y660



(X) WATCH FOR THIS CONNECTION ON SOME MODELS AS IT CONNECTS AT THE SWITCH AND WILL PLACE 110 V. A.C. ACROSS PANEL LIGHTS

NOTE:
TERMINALS #6 & #2 ARE SHORTED BY JUMPER OR SEND-REC. RELAY.

FIGURE 6

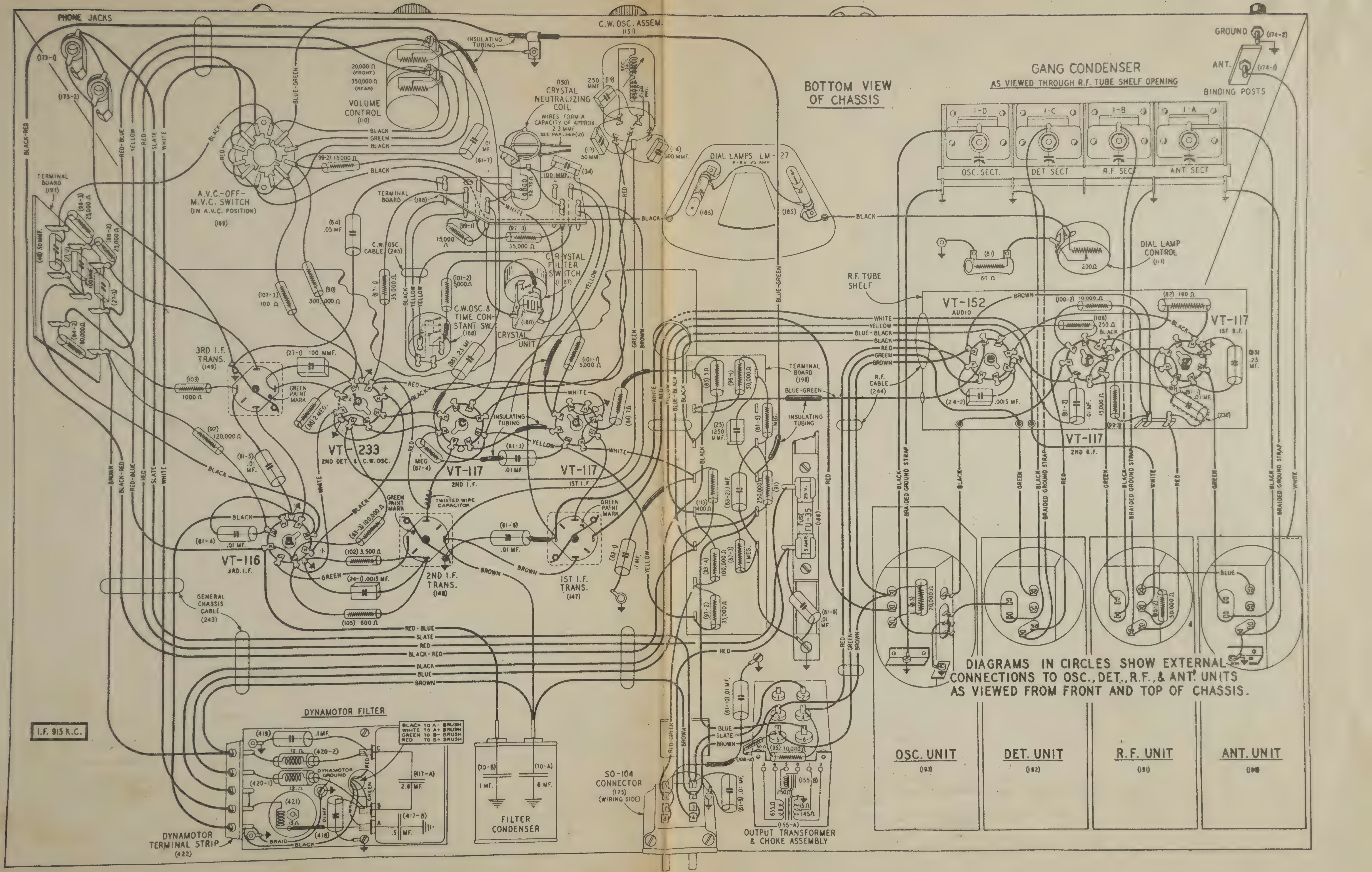


FIGURE 5 -348

Radio Receiver BC-348-J, Wiring Diagram of Chassis

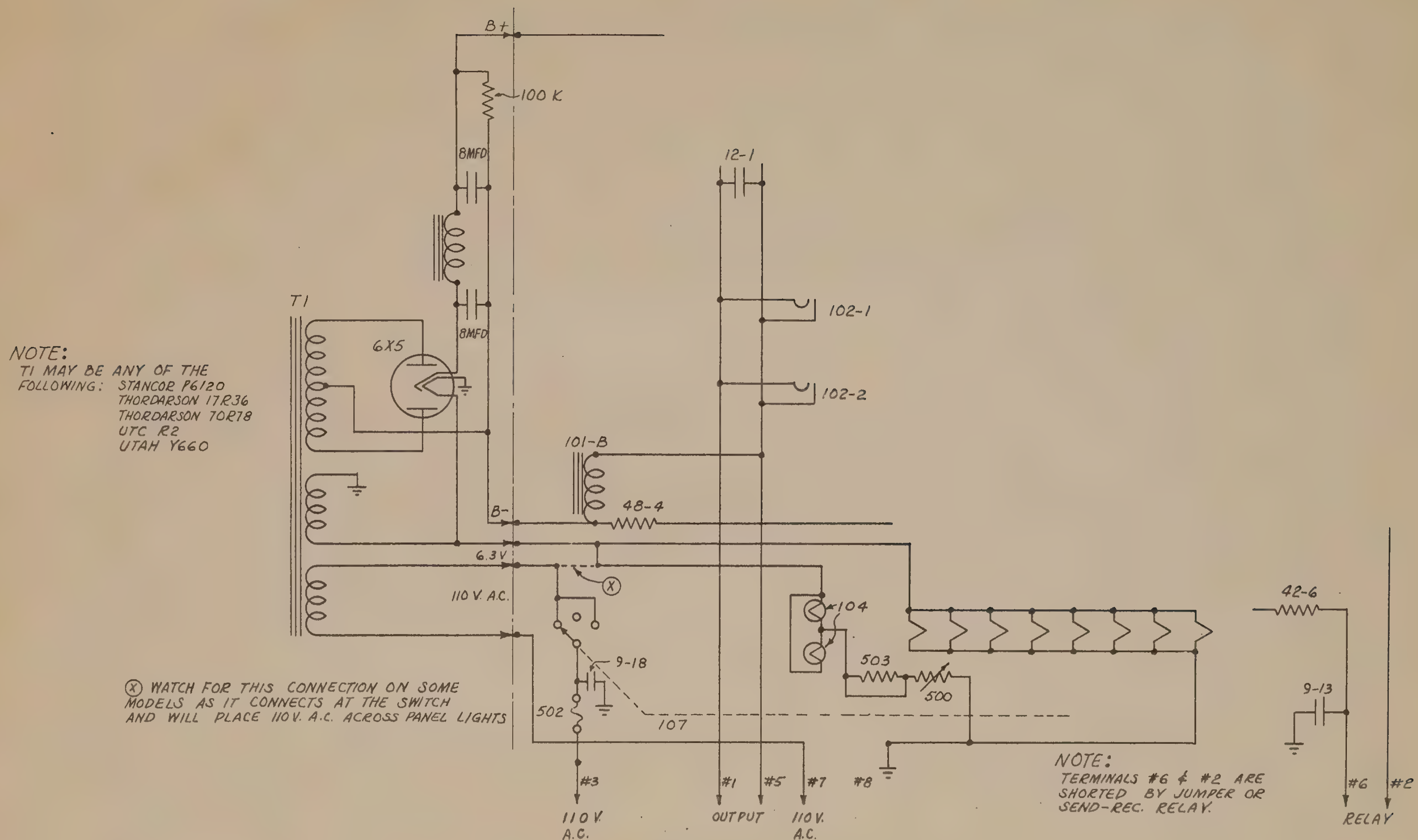

B+
100 K
8MFD
8MFD
T1
6X5
B-
6.3 V
110 V. A.C.
12-1
102-1
102-2
101-B
48-4
104
503
500
9-18
502
107
42-6
9-13
#3
110 V. A.C.
#1
#5
OUTPUT
#7
110 V. A.C.
#8
#6
#2
RELAY
NOTE:
T1 MAY BE ANY OF THE FOLLOWING: STANCOR P6120
THORDARSON 17R36
THORDARSON 70R78
UTC R2
UTAH Y660
(X) WATCH FOR THIS CONNECTION ON SOME MODELS AS IT CONNECTS AT THE SWITCH AND WILL PLACE 110V. A.C. ACROSS PANEL LIGHTS
NOTE:
TERMINALS #6 & #2 ARE SHORTED BY JUMPER OR SEND-REC. RELAY.

FIGURE 6

10 METER MOBILE TRANSMITTER AND RECEIVER

The SCR-274-N transmitter and receivers were originally made for portable use. The transmitters are light, compact, and powerful. The receivers are light, compact, and sensitive. Above all they are economical as current market prices bring them within the reach of everyone.

With these facts in mind we changed the power supplies and wiring of the units to accommodate the use of six volts as a primary source.

We gave consideration of the use of V. F. O. but decided against this for several reasons, including: the necessity of climbing out to retune, drift caused by voltage variation, etc.

The final analysis resulted in the inclusion of one of our favorite circuits to combine with the SCR-274-N Transmitter. The harmonic generating crystal oscillator of the SCR-522 transmitter BC-625. It works well with any tetrode tube and combines the better qualities of the old Tritet and still older Pierce. This gave plenty drive for the 1625s and left only the coil pruning in two inductances to finish the job.

We used the original modulator with wiring revisions to accommodate the familiar PE-103, in place of the dynamotor which comes with the equipment. The PE-103 gives us 12 volts for the filaments of the transmitter and 500 VDC for plate. Of course, any power delivering these voltages may be used.

By rewinding the antenna relay coils for twelve or six volts and installing two more ceramic feed-through insulators for the receiver antenna connection, we are practically ready to go on the air.

Of course, it's not that simple, but with the following information it won't take long to get that portable mobile working.

LET'S START, BY MODIFYING THE TRANSMITTER.

Remove the covers from the oscillator coil and the bottom of the transmitter. Remove the oscillator padding condenser. Remove the oscillator coil and pull up on it till the leads are exposed and snip them off. Take off the antenna loading coil by removing the four small screws that are in the transmitter face and hold the bracket ends. Remove the coil contactor. Take out the screws that hold the angle brackets at the foot of the final amplifier coil and the three flat fillister screws adjacent to it, which releases the final padder condenser. Now turn the set bottom up and clean off the wiring from the oscillator tube base and all but the filament and ground leads from the target tube base. Remove the ballast resistor which parallels the target tube filament and drop the leads from the plus end down to pin No. 2 of the same tube. Remove the flexible shaft between the two tuning condensers and by removing the screws from the top, drop out the oscillator tuning condenser. Remove the antenna relay.

To start rebuilding, get a mounting terminal, or build one, with four mounting studs as shown in cut No. 10-274-N and mount the circuit components as shown. Then tuck it into the corner of the transmitter as suggested. Solder a length of stiff bus wire to the stator of the oscillator condenser on the drive shaft side and bend it so that when the condenser is replaced the bus wire will come up between the two 1625 bases and the oscillator condenser frame. Replace the condenser. Put a small mounting strip on the side as also shown in cut No. 10-274-N for the final grid choke and resistor and drill a hole for the shaft bushing in the front panel in the opposite corner from the tuning knob. This shaft is approximately 6½ inches of flexible cable plus the solid fittings.

Remove the meter and thermal unit from the antenna relay BC-442. The thermal unit is mounted on the deck of the transmitter between the antenna coupling coil shaft and the cover. One of the holes which formerly held the loading coil contactor will give the location for drilling the other mounting hole.

The crystal supplied with the transmitter is mounted in a sealed unit with octal base contacts. The contacts used for this crystal are three and seven. The same socket was utilized for the 7 mc crystal since it was mounted in an FT-243 holder. If only old type crystals are available an adapter may be made from an octal tube base.

Now let's get to the coils. The oscillator coil you will notice, has an inner coil suspended on cross wires. If you possess cutters that will reach in the coil, cut out the soldered chunk in the center and gently (that ceramic cracks if you rough it) pull the cross wires out. Not having the cutters for the job, put the coil in a clamp or vise and heat the cross until it is good and hot, clear to the outside, and pull the pins out using a pair of pliers and much speed and dexterity. Clean off all the old winding, being careful to keep the heavy primary winding in good shape. Bend the grounding lug at the base out of the way and cut it off.

When ready, take the old primary and wind it back on for 5 turns, spacing the wire one-half wire diameter or, if using transmitter BC-457, use the groove as in the original. Start at the bottom and wind counter-clockwire; tuck your top turn into the hole about midway up the coil. The hole faces the oscillator tube when the coil is in position. Bring the free end down inside the coil and attach it to coil pin No. 8 (pin numbers are shown in transmitter figure 5-274-N diagram). Solder a lead from the start of the winding to coil pin No. 1.

After stripping the final tank T-54 of all but the coupling loop (that includes the parasitic suppressors) get into the bottom and reduce the winding on the coupling loop by at least one turn.

Now, working with a soldering iron and needlenose pliers, remove the lug that was used to anchor the parasitic suppressors. When free, use the same finger burning process to reinsert in the hole at the back of the coil nearest the tubes. This allows the coil ending to be as close as possible to the 1625's plate caps and offers an anchor spot for the plate leads. Starting from the bottom solder lug of the coil, wind counter-clockwise up the form, at such an angle as to cause the first quarter turn of the wire to pass through the angle slot on the coil body, and then wind three turns of No. 12 bare tinned copper wire, spacing the turns about ¼ inch and ending on the top lug.

Neither coil has any use for the slug unless someone would like to make the two circuits track. This would be handy in a small way, but for the sake of simplicity, we decided against this.

The circuit capacities in the final amplifier pile up due to construction details, and this, at first, caused the tuning to be most critical and in the minimum extreme of the condenser. Rather than remove the condenser plates, we tapped down the lead, from condenser C65 to plate, three-fourths of a turn and gave ourselves a little room on the tuning dial. Tuning is not critical as far as divisions go, due to the large geared-down ratio of knob to shaft, and because of the tapped down connection. The parasitic suppressors originally on the coil will not do, for they absorb 28 mc with enough gusto to burn themselves up. With misgivings, we cut them out and found no trace of parasitics, and so, did not replace them. It may well be that others will not have that much blind luck, but any of the usual type in general use for those frequencies should do.

The antenna relay poses a question for the user. In the test setup the relay supplied was removed, taken apart, the windings removed and rewound with No. 26 SCC wire. Reassembled, it worked with fair snap at six volts. To be sure of positive action, it was later replaced with a standard

Leach relay. A coaxial connector (Jones 101), was fitted into the transmitter front in place of the original feed through, and another further down, to the side, for a lead to the receiver. In either case, twelve or six volts may be used to activate the relay, depending on which type is at hand, for the relay is activated from a contactor in relay 3-E-6 in the PE-103.

If the original antenna relay is kept, the left hand bracket of the loading coil must be retained, for the contactor it holds is part of the antenna relay. The bottom contact may be changed to a feed-through bushing and used for the receiver antenna post. The transmitter relay, K-53, under the chassis is not essential and rather in the way. This was removed entirely and leads from it, soldered direct.

Due to the new location of the final grid resistor, the old connection to pin two of J-64 was not used. This connected to the grid resistor and allowed voltage impressed across it to be read when a certain type of test gear was used. As there are no metering jacks in the rig, this may be connected by a lead to the grid connection in mention and used to tune up with, using a voltmeter. This is difficult, however, and in our model, two closed circuit jacks were mounted in insulated bushings in the side of the transmitter above and forward of that portion covered by the mounting rack. One of these was used in the final grid circuit to read grid curretn, and the other in the plate circuit. These jacks may be installed, if desired, in the mounting rack, and would then read plate current of the oscillator and final. We preferred to read the final grid current for check purposes and so installed the jacks in the set.

Now some word about the antenna current indicator. In our model, the thermocouple from the separate antenna relay was mounted in the transmitter proper and the ground lead from the coupling coil was piped through the R. F. end of the thermocouple to ground. By grounding the negative side of the thermocouple output and running a lead from the positive, back through and under the chassis deck to pin No. 2 of J-64 which, as we above stated, is not used, we then had a connection back through the system to the control head utilizing one of the selector wires which is not in use. This enabled us to mount the indicator from relay BC-442 on a small plate affixed to the transmitter remote control and serves at all times to tell whether no answer from a call is due to skip, QRM, or no output from the transmitter.

A 12A6 tube was used for the oscillator as it was at hand in one of the 274N receivers. It works nicely with plenty of output.

For those inclined to fine detail work the modulating equipment may be stripped out of case and mounted either in the transmitter or on the transmitter rack. As there is an unused tube socket in the transmitter, this would accommodate a tube for the modulator. 6L6s would do the job nicely. Put the filaments in series. One for the crystal oscillator and one for modulation.

MODULATOR

The modulator will have to undergo some alteration; not in changing circuits but in eliminating them. Number one item is the tone oscillator and its associated components. This tube may be used if any other type mike is wanted, but if the old faithful carbon mike is retained, there is no use for it. The relays are 24 volt and difficult to rewire, so were eliminated by using those in the PE-103.

Taking out this one tube looks simple and is, but the difficulty lies in finding the right wire to snip out. A practical wiring diagram is supplied, along with the schematic, and to save reams of paper and you, hours of time, we suggest you turn the modulator to a good light, and by studying the schematic, and locating the part in question by the practical drawing, put in the changes given in drawing No. 11-274-N. Briefly touched on, the changes are as follows:

The off-on switch originally supplied filament current to all heaters. The plus lead to the heaters has been lifted from J-54, pin 15, and a ground put to pin 15 instead. Pin 18 of that plug now goes to pin No. 1, J-52, and serves to complete the circuit through the genemotor energizing relay of PE-103—PL-148 and J-53 is now unused.

The grid lead which carries the audio from the junction of R-56 and R-55, which bridge the secondary of the mike transformer, is moved up to its new position of the top of R-56. This increases the drive of the audio tube just enough to overcome the loss of higher voltage in the microphone.

C-54-B which has a value of 20 mfd is cut out of the circuit because of the 12 volts feeding the filament is now negative. This is cured by placing a standard electrolytic, cathode by-pass, condenser in its place observing proper polarity.

R-65 is a portion of the voltage divider in the modulator that supplies the oscillator voltage. It should be replaced with a 10 K. 10 watt resistor.

POWER SUPPLY PE-103

In considering the various ways to use tne PE-103 Power Supply two questions arose. The first, would the wiring be left as it was originally? Two, what input was most likely to be used? Both questions can be answered at once. Few amateurs will have a twelve volt battery and the original wiring will seldom, if ever, be just what is needed. Therefore, we changed the wiring as shown on plate No. 12-274-N.

No particularly drastic revisions were attempted. When pin No. 1 of the output plug (a PL-51 and socket from the receiver—as no one seems to have the plug that goes with the PE-103) is grounded through the off-on switch of the remote control, the main contactor 3-E-2 from six volts source is closed, starting the dynamotor. Six volts was wired into the double pole single throw relay No. 3-E-6 and when the output lead from this coil is grounded through the mike push-to-talk button, 500 volts for the plates is cut into the modulator and six volts for the trans-receiver relay goes to the transmitter. The circuit breaker No. 3-E-4 and 3-E-3 are in the start-stop line and release the main contactor on any overload either in input or output.

Care must be exercised to determine what type of dynamotor is in your PE-103. There seems to be two types which differ mainly in which side of the low voltage input is connected to plus twelve volts of the generator. Without attention to this it is quite easy to get 18 volts DC across your filaments.

RECEIVER

To make the receiver function on ten meters is relatively simple. The only necessary changes can be done in two steps. The first, is the coil rewinding. Remove the bottom plate and all covers. To get the inner cover which is over the tuning condensers, off, it is necessary to pull the tubes and IF transformers. Two screws each hold the IF transformers on their sockets.

Now remove the RF coils, which are in the bottom front of the receiver. Two small screws hold the coils in. They may be found on the outside of each end of the RF coil assembly. The strip pulls out and coils may be separately removed when the four screws holding them in the can are removed. Each coil has a powdered iron slug mounted on a screw and held in place by fiber tab sprung across the inside of the form. For our purpose of quick change to 10 meter we simply removed the slug and forgot them. Not that they would not be useful but our business concerned only the pulling of turns from the original windings. This leaves the coils unbalanced for proper slug setting so it was simpler to do without.

In pulling coil turns, pull from the bottom (towards the socket) in the RF coils and the top in the oscillator coil.

In the antenna coil, notice that the method of input coupling has changed. The small series condenser in the antenna lead has been removed and lead run straight from the antenna post to the low impedance tap on the coil. The small condenser (C-1) is hidden behind the tuning condenser bank. There is an unused tap on the antenna coil which is used for the new antenna lead. By following drawing 8-274-N the coil dope should be easy to duplicate.

No particularly fine attempt was made to make tracking 100% across the dial. When the tracking was sufficient to fully cover the 10 meter band (from 8.3 to 9, on the dial), we started the second stage of conversion. The stator leads and the lead to the oscillator series padder condenser were disconnected. The dial was removed from the front of the receiver and the four screws holding the main condenser were removed. Then by rocking the condenser back it may be removed from the chassis. With the sidecutters snip off the long narrow tail from each rotor plate. This gives us room to mount a series condenser marked CX in drawing No. 8-274-N on the inside bottom of each of the three sections of the main tuning condenser. These series jobs are made by the Erie Resistor Co. and are designated as ceramican trimmer, type TS2A and have a value of 7 to 45 mmf. The trimmer stator lug projects straight along the main condenser stator plates and was soldered tight to them. Be careful in placing them to prevent the ceramicons from shorting on the RF coil plug base leads. Now put the tuning condenser back in place and hook up as it was before, using the ceramicons as the new stator leads.

With the coils complete and in place, turn the antenna and RF ceramicons to full capacity and the oscillator section about 30 degrees out. All of the original trimmers are left just slightly engaged. Now by means of a signal generator or by tuning and trimming till a strong signal is found, the set may be lined up. As individuals will vary in methods and ways to convert this receiver; our treatment, outlined above, is but a rough sketch of what may be accomplished. Our guiding thought in making these changes was to find the easiest and least expensive method to convert to 10 meters. No particular time was spent in evolving fine detail or procedure. The net result of these experiments was a transmitter with plenty of output and ease of operation and a receiver with fair sensitivity with the 10 meter band spread out over three major divisions of receiver remote tuning dial.

We suggest that user build into the receiver one of the simpler type noise limiting circuits, preferably one using IN34 crystals for diodes, for ignition noise can be quite a problem with this receiver.

RECEIVER FILAMENT CONVERSION

For 12 (6) volt operation it will be necessary to re-wire the tube filaments in parallel. In making these changes consult the practical wiring diagram for the receiver.

First remove the screws, by means of which, the by-pass condensers are mounted on each side of the chassis and pull up these condensers so that the tube sockets are exposed. Filament connections are made to pins 2 and 7 except tube VT-133(V7), which are made to pins 7 and 8.

Beginning with V8, remove the lead from pin 7 and re-connect it to pin 2. Ground pin 7. Remove the lead from pin 2 of V5 and connect it to pin 7. Ground pin 2. Remove lead from pin 2 of V4 and connect it to pin 7. Ground pin 2 which completes this modification.

The rack which the SCR-274-N transmitter slides into has places for two transmitters. As only one is needed, we suggest, and have used, that space for receiver.

The receiver rack has places for three receivers. We sawed free one rack complete with plugs, clamps and interconnection housing and bolted this unit in the unused transmitter place. While sawing we also cut one end or one complete section from the triple receiver remote control, which mounted with the transmitter remote control makes a neat small control installation.

For receiver power, several schemes were devised to obtain B+ voltage from the PE-103 but all were discarded because of the high current drawn by this unit. For listening over the band there is no sense wasting that much juice. We ended up by paralleling the receiver filament circuits and replaced the tubes in the receiver with equivalent six volt tubes. B+ is obtained from a Mallory six volt vibropack type VP-522. By using spacing washers between the vibropack and the old dynamotor mounting base we have a demountable vipropack held on the rubber shock mounts by snap-slides.

OPERATING NOTES FOR THE 10 METER MOBILE TRANSMITTER

In operation the crystal oscillator draws approximately 21 mills plate and screen. At this current 7 mills drive may be realized in the grids of the amplifier. This will seem high but for the use of tubes in parallel that double in the plate, it may be necessary.

Final plate current at no load is also high; somewhere between 45 and 60 mills, but this condition is not unusual in tetrodes, doubling at 28 mc. The amplifier may be loaded up to 120 mills by the usual quarter wave, whip antenna.

Some difficulty may be experienced with downward modulation unless all load factors are carefully controlled. Please remember that screen grid modulation is easy to abuse. Unlike some modulation methods the screen grid voltage must be carefully handled. The amount of drive, the amount of load and the amount of modulation voltage is critical. A modulation percentage of about 80 may be expected from this transmitter without trouble. Do not remove resistor R-62 from the modulator transformer secondary in an effort to get more signal. Without it the screen voltage runs wild on peaks. One of the principal reasons for using the antenna current indicator is to check for downward modulation which is almost sure indication of improper screen operation. Bias voltages must be high, above one hundred volts, before the modulation settles down to good work.

Twenty meters can be reached in the same manner as the ten meter conversion with the exception of the coils and crystal used.

The oscillator coil will have seven turns and the amplifier coil will have five. For twenty meters the parasitic suppressors may be left in and there is no need to shorten the plate leads by putting the solder lug in the back of the coil. An 80 meter crystal is used in this version.

For those who possess the BC-459, 20 meter operation is simple to the extreme. This unit tunes from 7 to 9.1 mc. The oscillator gives enough drive to allow doubling in the amplifier plate circuit by rewinding the coil in that stage to hit 14 mc and separating the tuning condensers (don't forget the main dial drive is connected to the amplifier condenser first) tuning shafts. Full power cannot be realized but twenty watts peak can be extracted and that's plenty for exciting a following stage.

For those who have not been able to obtain the BC-459 we have included in these pages an outline of the steps necessary to convert the BC-458 to cover the 7 to 7.4 mc range as it normally covers 5.3 to 7. (We also include the data for changing the BC-457, 4 to 5.3 mc to cover the 80 meter range.) The revamping did not change the frequency stability enough to notice.

For those who will want 40 meter CW operation there are several ways of keying the transmitter. In aircraft installation the transmitters are keyed by using antenna relay unit BC-442 and letting the transmitter run continuously. This is not good practice for amateur use and we suggest

revising the bias system of the amplifier for bias keying. We have seen and heard some stations that use relay K-53 for keying but in most cases there was a noticeable chirp on the signal. Please note that bias resistor R-75 is not a keying aid. It serves only to self bias the amplifier to nearly cut-off when relay K-53 is open.

INSTRUCTIONS FOR CONVERTING THE BC-458-A (5.3-7 mcs.) TO 40 METER USE

If the transmitter is to be used with a 24 volt supply no changes are necessary. If a 12 volt supply is to be used the tube filaments must be wired in parallel. The relays should be closed or removed entirely. If the unit is to be used as a V.F.O., the antenna loading coil may be removed and the variable link on the final tank coil terminated in a suitable low impedance jack mounted on the side or face of the unit.

There are two methods for changing the frequency range of the transmitter. The simplest is as follows:

Set the dial at 7.0 and remove the shield can from the oscillator section. Loosen the locking set screw and reduce the capacity of the oscillator padding condenser. With the aid of a calibrated receiver or frequency meter, adjust the capacity of the padder to the highest frequency (7.3 or 7.4 mcs.). Place a milliameter in the high voltage lead of the final amplifier and adjust the amplifier padder for minimum plate current.

This method is satisfactory if one is not interested in the dial being calibrated and wishes to set his frequency on the frequency of the station to be called. This is accomplished by tuning the V.F.O. to the frequency to which the receiver is tuned. If dial calibration is desired, the following method should be used:

Remove the oscillator shield can and short out exactly one turn at the top of the oscillator coil; screw the iron cord to within one turn of being all the way in, and replace the shield can. Be sure to replace the can in the final position as any change in the tightness of the shield will change the frequency. Adjust the trimmer for the highest frequency (7.4) with the dial set at 7.0. After this frequency has been set at exactly 7.0 on the dial set the dial to 5.8 mcs. which is 6200 kcs. (the frequency of the crystal) and trim with the iron core slug until resonance is indicated by the magic eye. Retune to 7.0 on the dial and retune the oscillator padder. It may be necessary to repeat the procedure several times to insure proper tracking. After the oscillator is tracking properly the same procedure is followed with the amplifier. Short one turn on the amplifier tank coil and screw the slug down to within two turns of being all the way in. Tune the amplifier trimmer and the iron cord slug for minimum plate current which should be within four milliamperes of the same value at both ends of the dial.

It may be desirable to cover the numbers on the dial with a decal but the unit can be operated very easily by marking the dial settings with the corresponding frequencies on the small plate on the front of the unit as shown in the example below:

Dial	Frequency
5.8	6.2 mcs.
6.6	7.0
6.7	7.1
6.8	7.2
6.9	7.3
7.0	7.4

INSTRUCTIONS FOR CONVERTING THE BC-457-A (4-5.3 mcs.) TO 80 METER USE

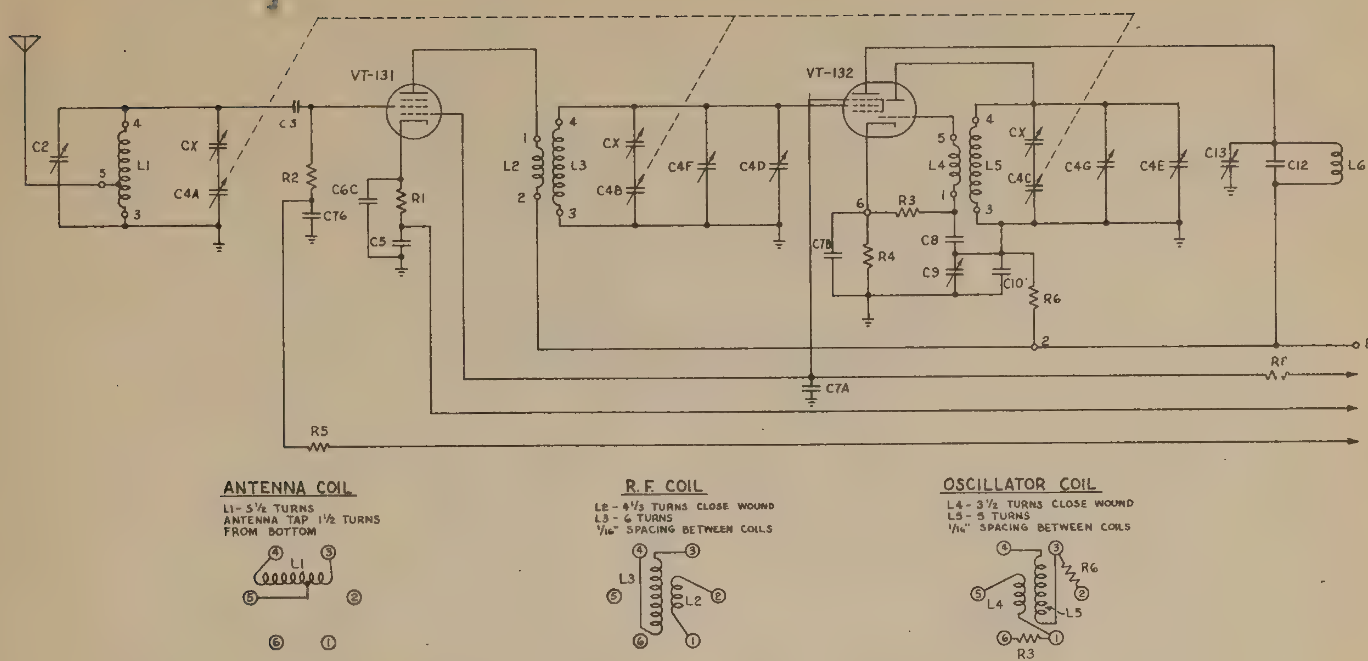
If the transmitter is to be used with a 24 volt supply no changes are necessary. If a 12 volt supply is to be used the tube filaments must be wired in parallel. The relays should be wired closed or removed entirely. If the unit is to be used as a V.F.O. the antenna loading coil may be removed and the variable link on the final tank coil terminated in a suitable low impedance jack mounted on the side or face to the unit.

First remove the shield can over the oscillator section and add four turns to the top of the oscillator coil. This may be done easily by using a small C clamp fastened to the top turn so the coil will not unwind and soldering a length of bell wire or hook-up wire to the end of the winding. After winding four turns, re-solder the end to the condenser lead and remove the C clamp. Insulated wire is suggested since it is necessary to close space the turns. Set the dial to approximately 5.1 which corresponds to 4.6 mcs. (the crystal frequency) and adjust the tuning slug until the magic eye indicates resonance. Set the dial at 4.0 which should be 3.5 mcs. This can be checked by means of a calibrated receiver or frequency meter. If the 3.5-4.6 range falls outside the dial readings 4.-5.1 decrease the capacity of the padder. If this range falls inside these settings, increase the capacity. It will be necessary to make these adjustments several times to make the unit track properly.

After the oscillator is tracking correctly the amplifier must be adjusted. Add four turns to the top of the amplifier tank coil and insert a milliameter in the plate circuit. Adjust the amplifier padder for minimum plate current which should be within three milliamperes for the two ends of the band. If the difference is greater the capacity should be adjusted to give an almost constant value between 3.5 and 4 mcs. as the 4.6 mcs. frequency will be used only to check the calibration and higher current at that frequency is of no consequence. If desired, the unit can be made to track over the entire band.

It may be desired to cover the dial settings with a decal but the unit can be operated very easily by marking the dial settings with the corresponding frequencies on the small plate on the front of the unit as shown in the example below:

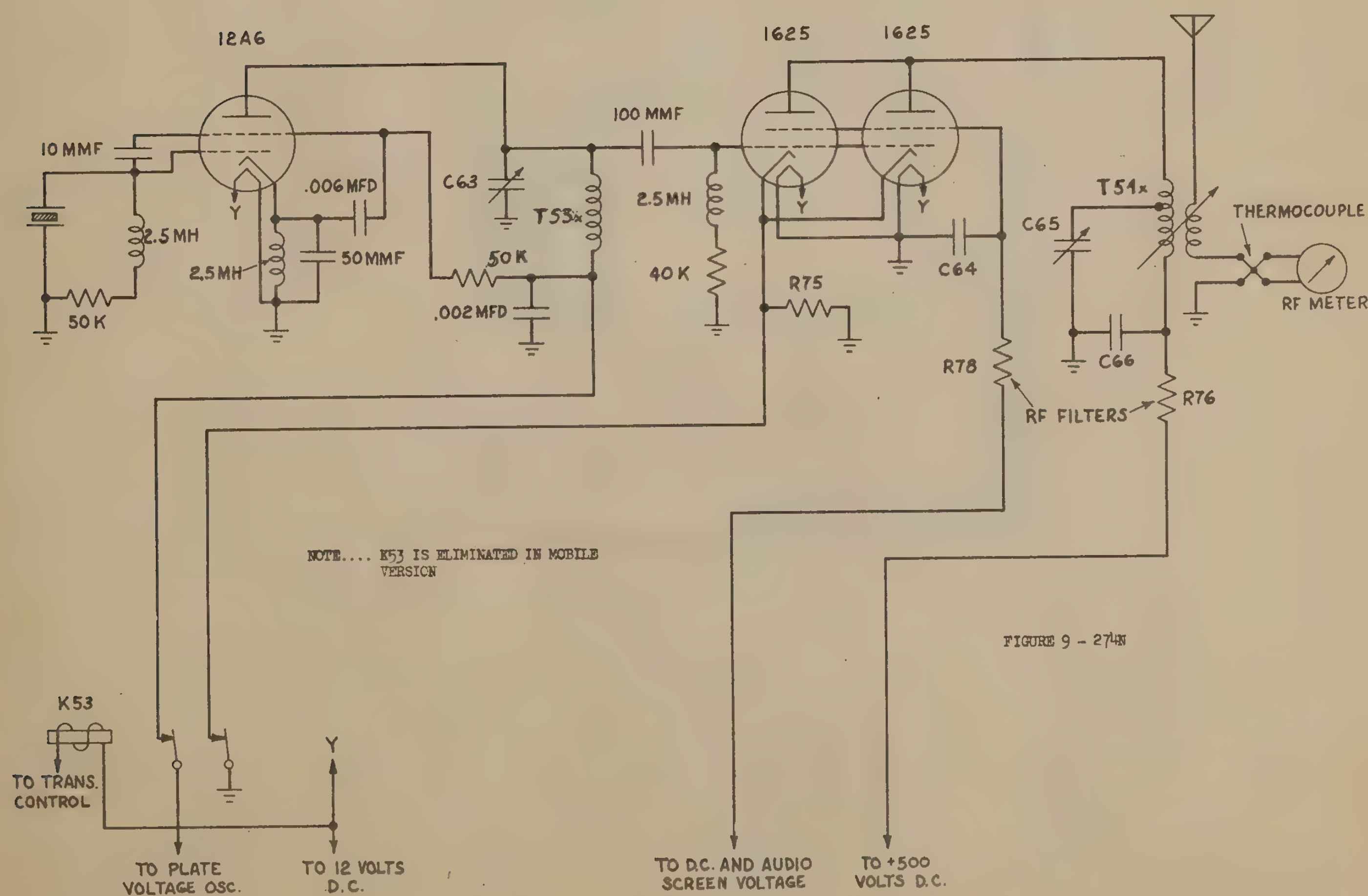
Dial	Frequency
4.0	3.5
4.1	3.6
4.2	3.7
4.3	3.8
4.4	3.9
4.5	4.0



NOTE

THE R F SECTION REMAINS UNCHANGED WITH THE EXCEPTION OF THE ANTENNA COIL AND THE ADDITION OF SERIES CONDENSOR C X WHICH IS A VARIABLE CERAMIC TRIMMER CONDENSOR, 7 TO 45 MMFD

FIGURE 8-274N



NOTE.... K53 IS ELIMINATED IN MOBILE VERSION

FIGURE 9 - 274N

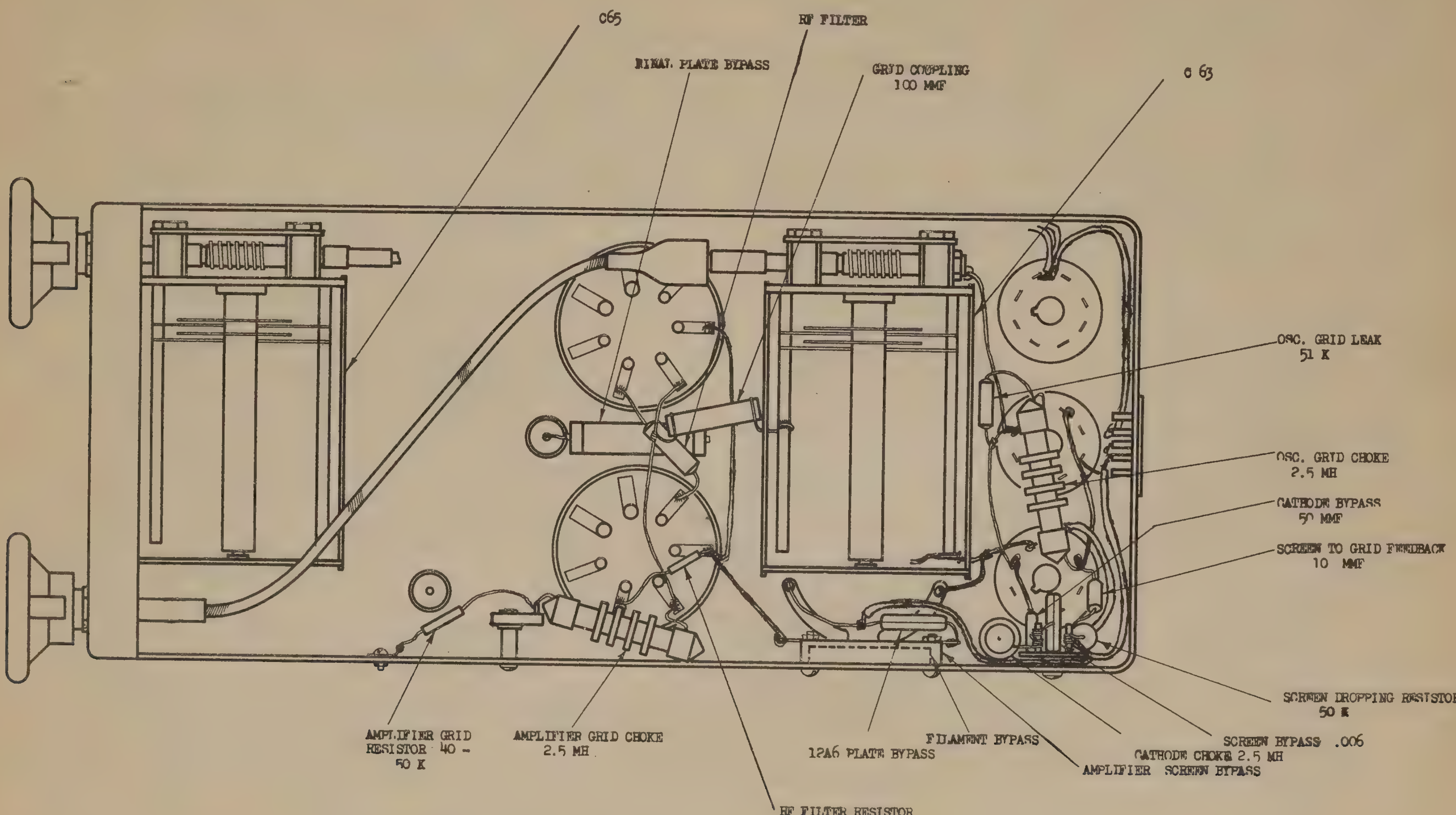
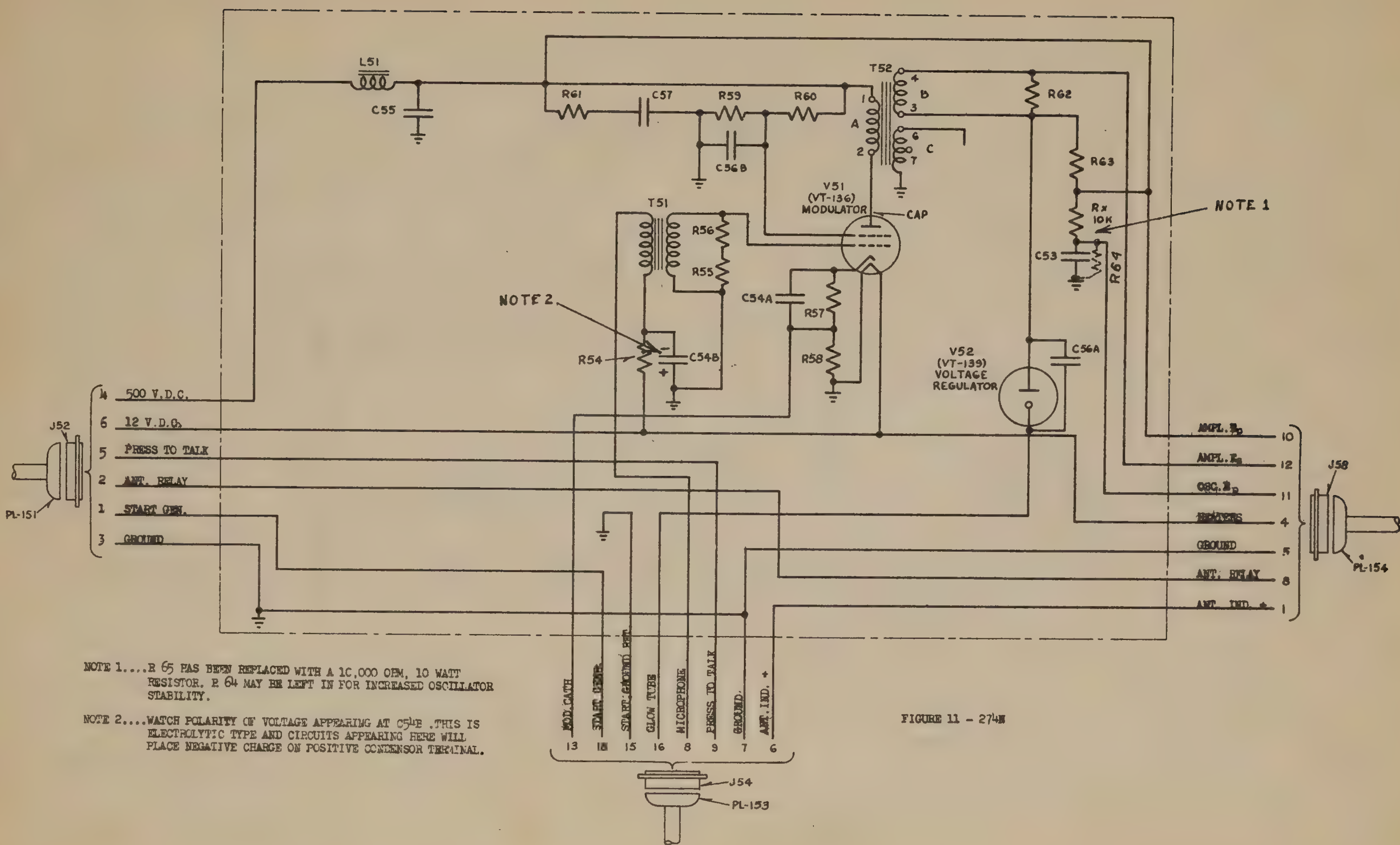


FIGURE 10-274N



NOTE 1....R 65 HAS BEEN REPLACED WITH A 10,000 OHM, 10 WATT RESISTOR. R 64 MAY BE LEFT IN FOR INCREASED OSCILLATOR STABILITY.

NOTE 2....WATCH POLARITY OF VOLTAGE APPEARING AT C54B .THIS IS ELECTROLYTIC TYPE AND CIRCUITS APPEARING HERE WILL PLACE NEGATIVE CHARGE ON POSITIVE CONDENSOR TERMINAL.

FIGURE 11 - 274N

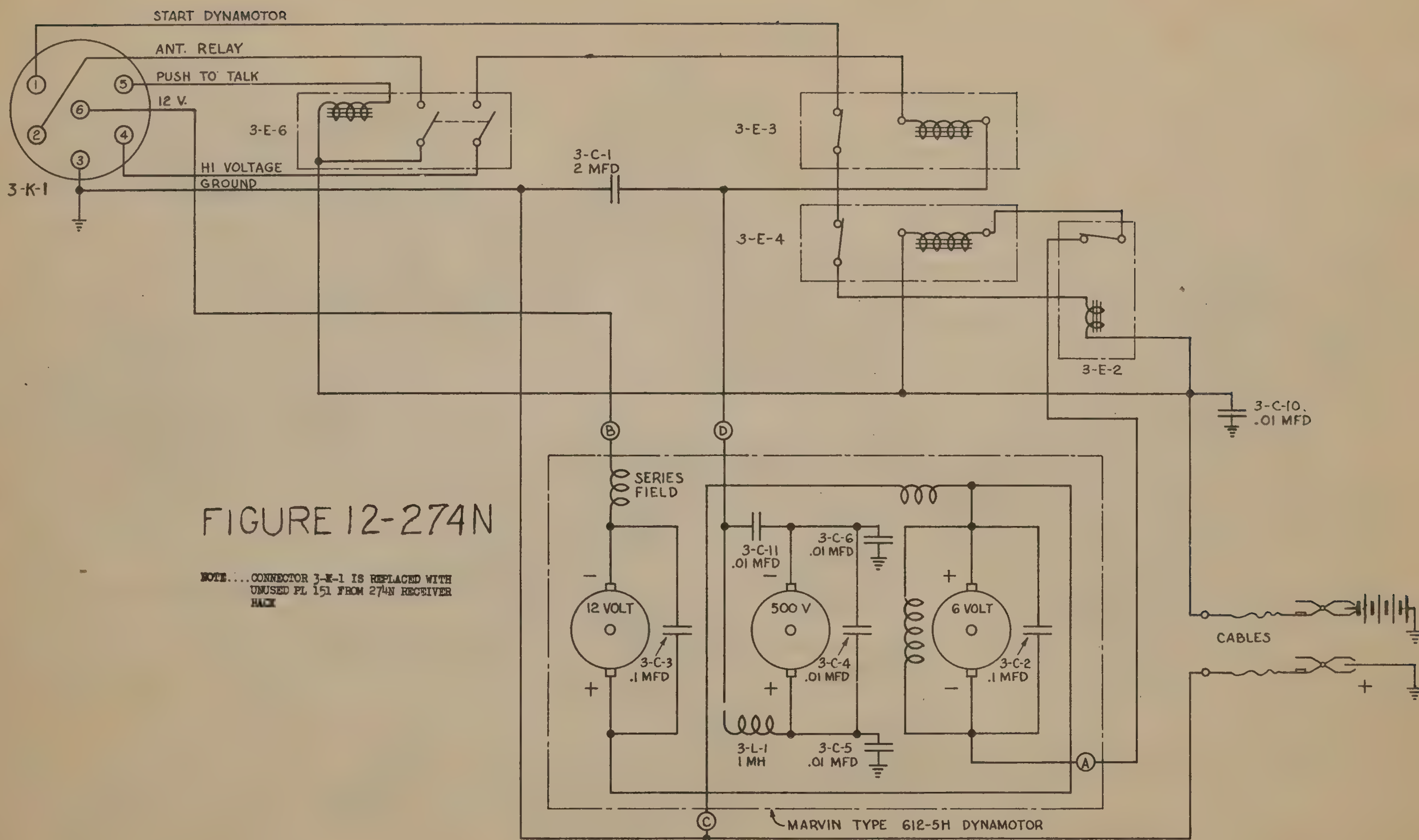


FIGURE 12-274N

NOTE....CONNECTOR 3-K-1 IS REPLACED WITH UNUSED PL 151 FROM 274N RECEIVER RACK

APN-1

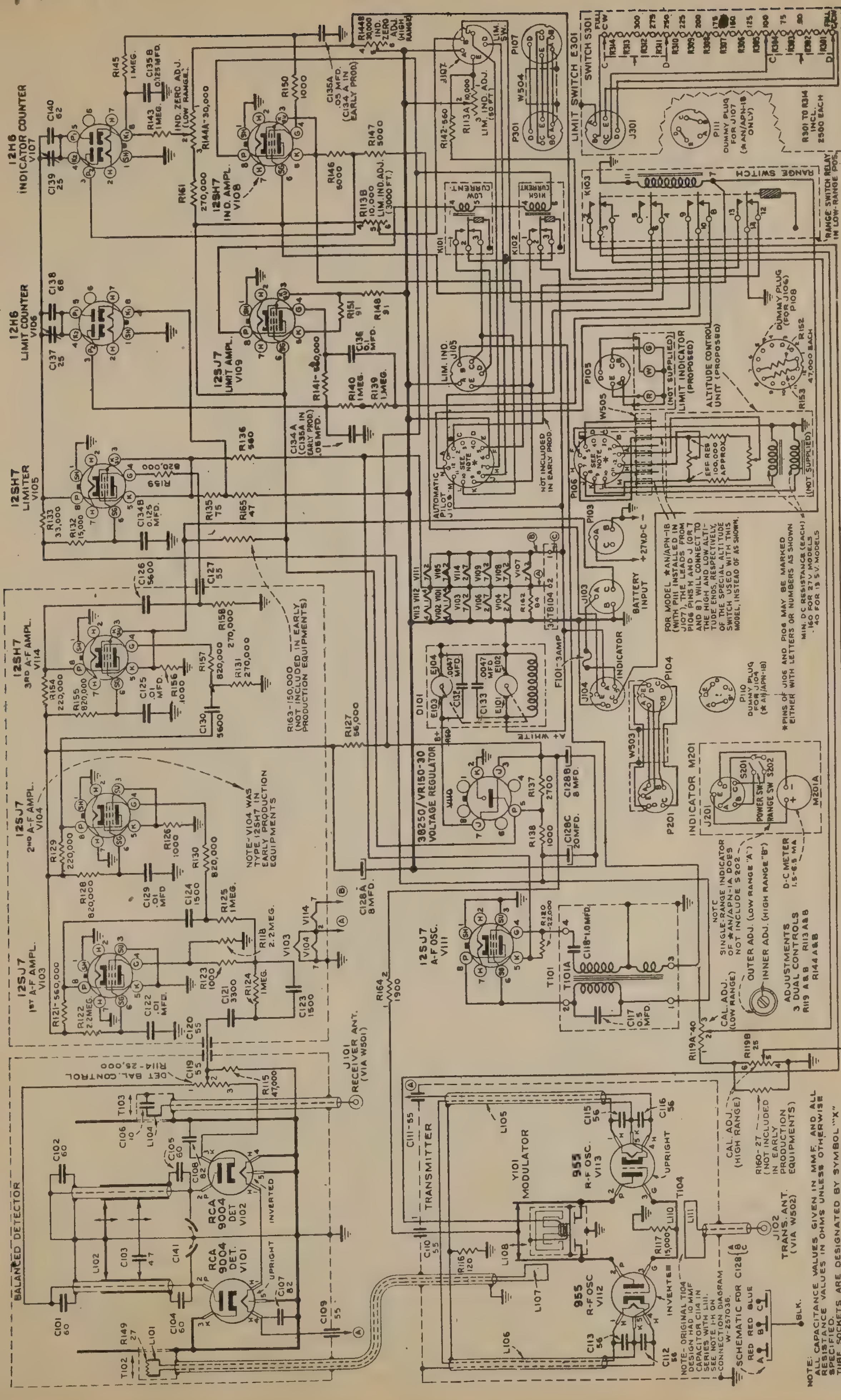


FIGURE 1 - APN-1

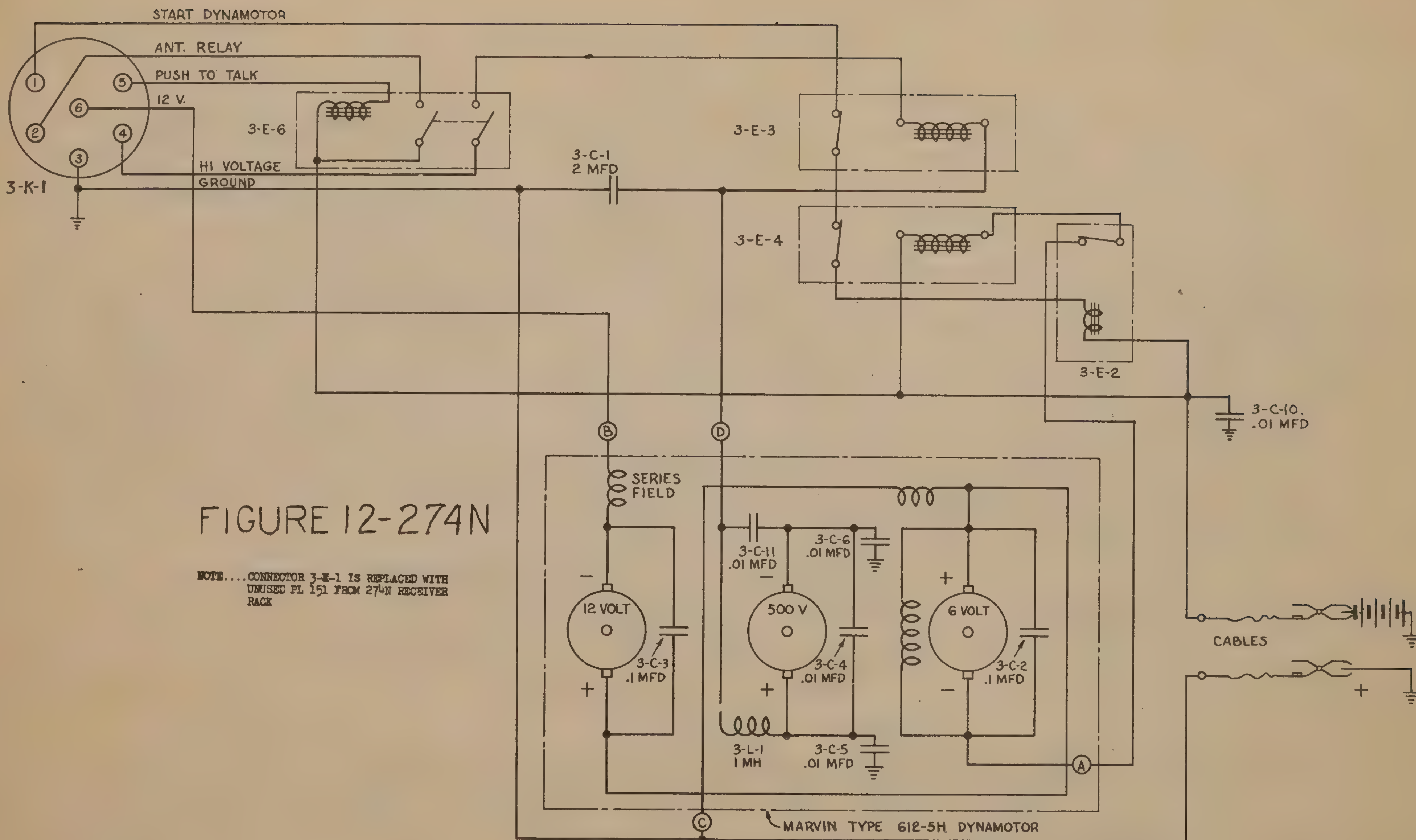


FIGURE 12-274N

NOTE....CONNECTOR 3-K-1 IS REPLACED WITH UNUSED PL 151 FROM 274N RECEIVER RACK

APN-1

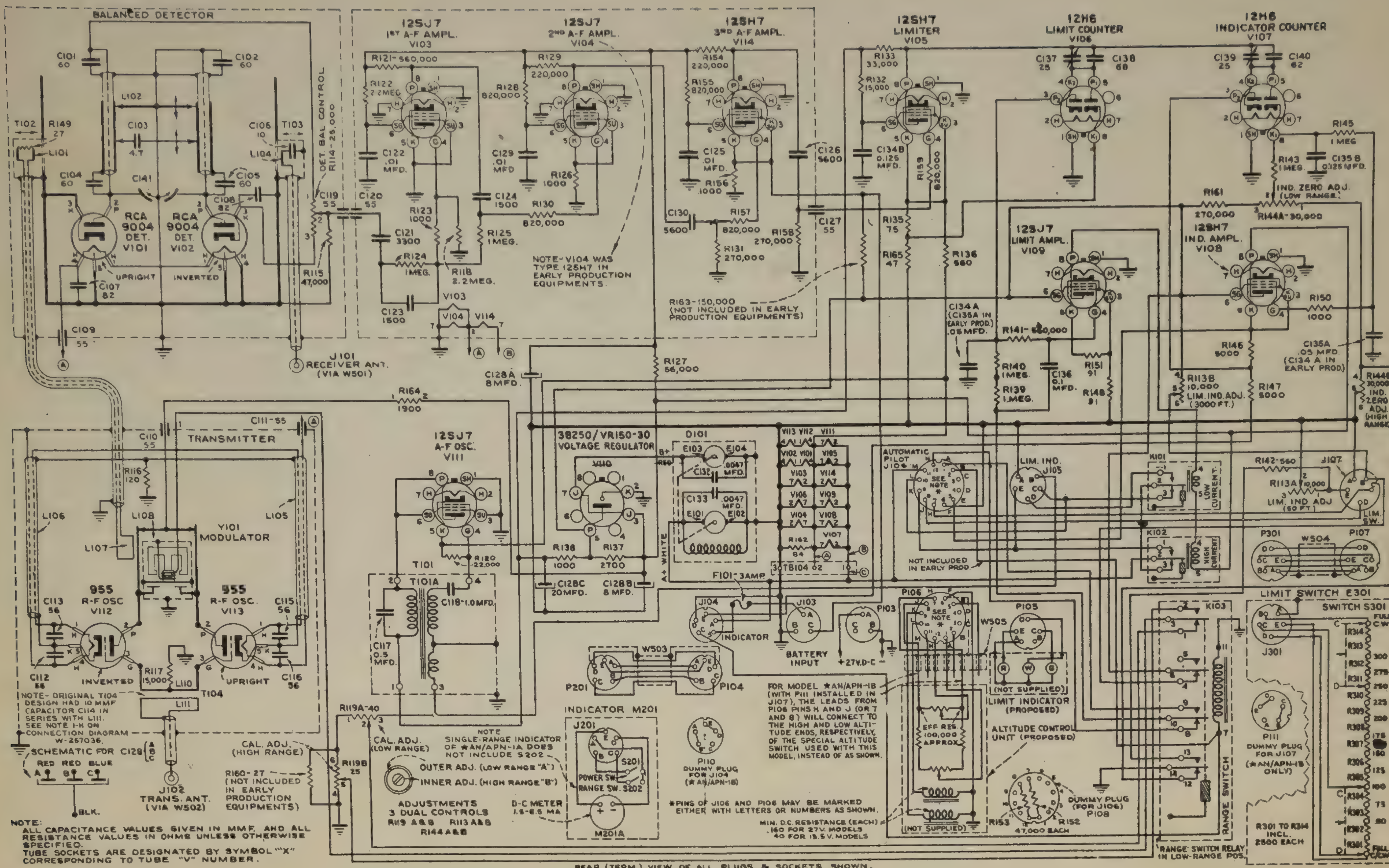


FIGURE 1 - APN-1

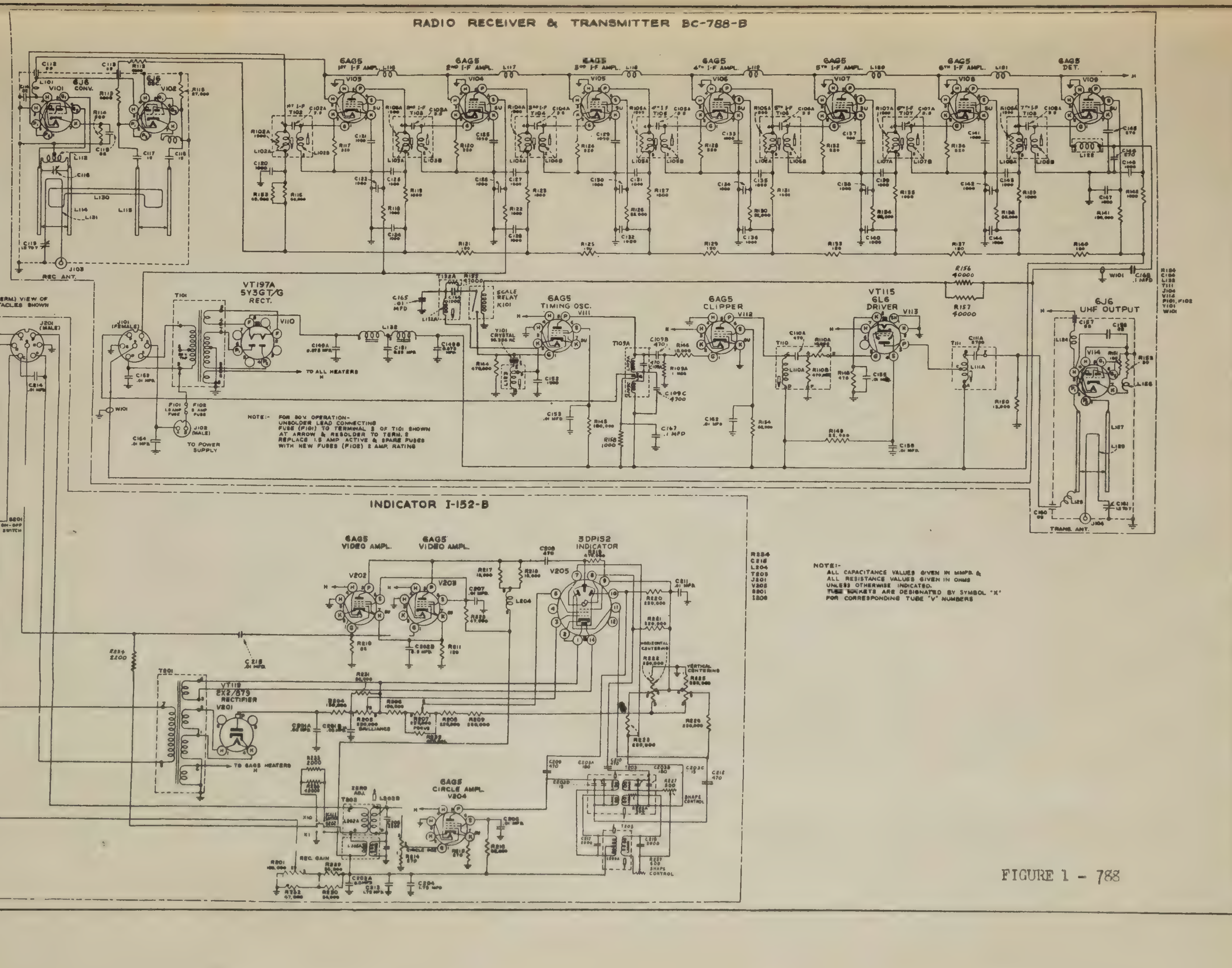


FIGURE 1 - 788

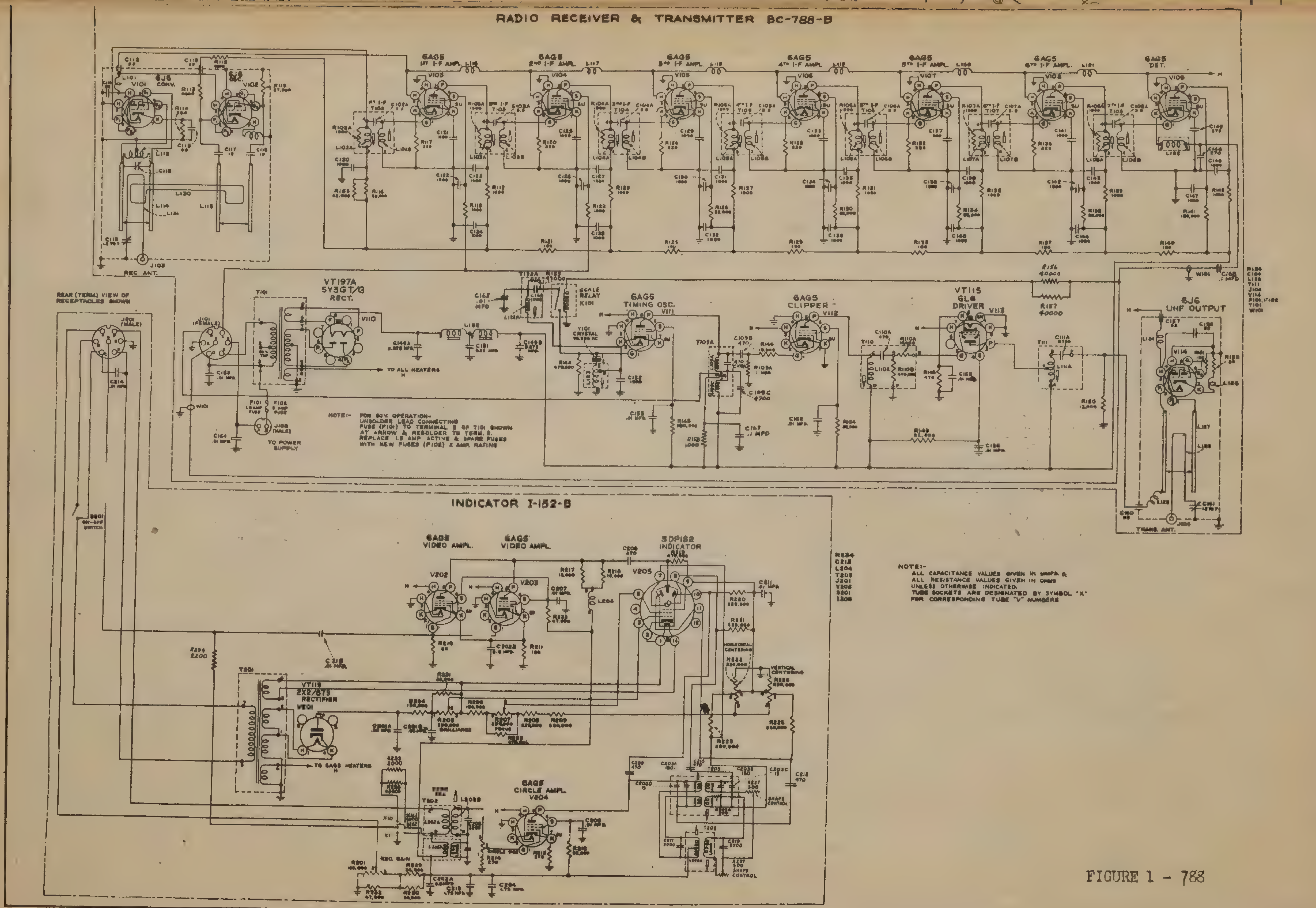
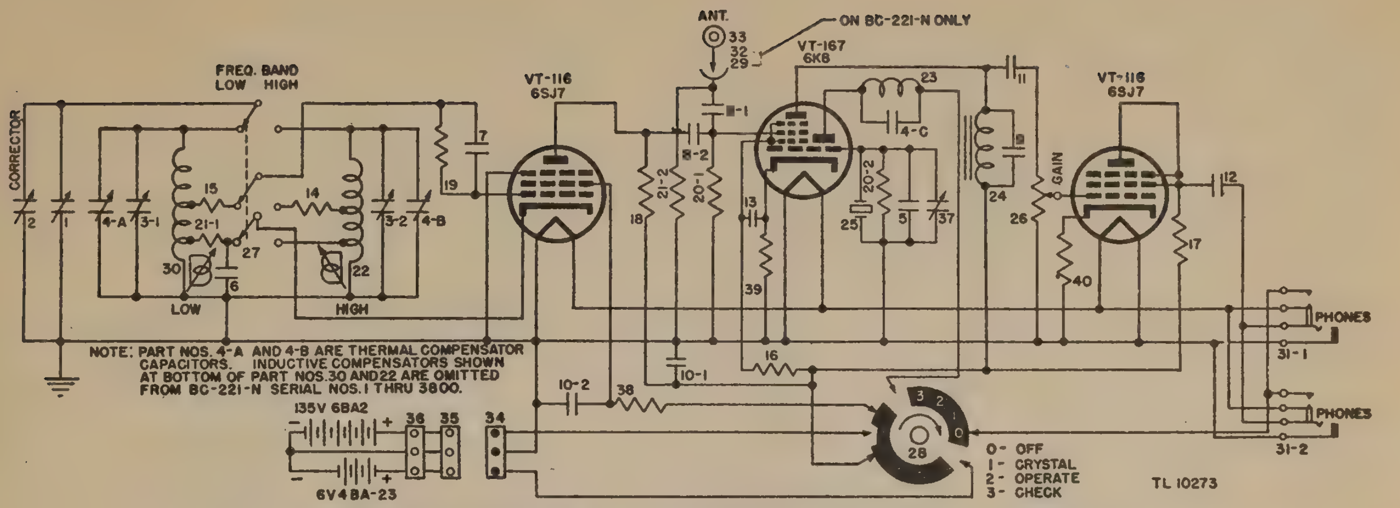

RADIO RECEIVER & TRANSMITTER BC-788-B
6AG5 1ST I-F AMPL.
6AG5 2ND I-F AMPL.
6AG5 3RD I-F AMPL.
6AG5 4TH I-F AMPL.
6AG5 5TH I-F AMPL.
6AG5 6TH I-F AMPL.
6AG5 DET.
6J6 CONV.
6J6 OSC.
REC. ANT.
VT197A 5Y3GT/G RECT.
6AG5 TIMING OSC.
6AG5 CLIPPER
VT115 6L6 DRIVER
6J6 UHF OUTPUT
TRANS. ANT.
SCALE RELAY K101
TO ALL HEATERS
TO POWER SUPPLY
REAR (TERM.) VIEW OF RECEPTACLES SHOWN
NOTE:- FOR 80V. OPERATION- UNSOLDER LEAD CONNECTING FUSE (F101) TO TERMINAL 3 OF T101 SHOWN AT ARROW & RESOLDER TO TERM. 2. REPLACE 1.5 AMP ACTIVE & SPARE FUSES WITH NEW FUSES (F102) 2 AMP. RATING
INDICATOR I-152-B
6AG5 VIDEO AMPL.
6AG5 VIDEO AMPL.
3DP1S2 INDICATOR
VT119 2X2/879 RECTIFIER
TO 6AG5 HEATERS
6AG5 CIRCLE AMPL. V204
HORIZONTAL CENTERING
VERTICAL CENTERING
SHAPE CONTROL
REC. GAIN
BRILLIANCE
FOCUS
NOTE:- ALL CAPACITANCE VALUES GIVEN IN MMFD. & ALL RESISTANCE VALUES GIVEN IN OHMS UNLESS OTHERWISE INDICATED. TUBE SOCKETS ARE DESIGNATED BY SYMBOL "X" FOR CORRESPONDING TUBE "V" NUMBERS

FIGURE 1 - 788



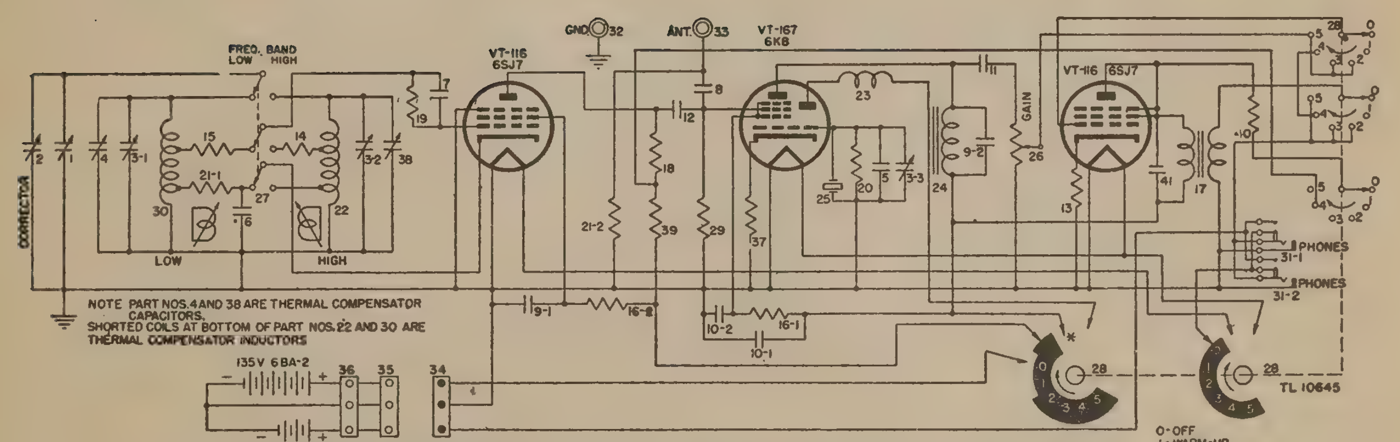
REF	DESCRIPTION	REF	DESCRIPTION	REF	DESCRIPTION	REF	DESCRIPTION	REF	DESCRIPTION
1	200 μμf	9	.002 μf	17	15,000 OHM	25	CRYSTAL	35	POWER JACKS
2	1.2 μμf	10-1&2	.1 μf	18	50,000 OHM	26	0.5 MEGOHM	36	BATTERY TERM.
3-1&2	15 μμf	11	.25 μf	19	330,000 OHM	27	SWITCH	37	12 μμf
4-A,B,C	10 μμf	12	2 μf	20-1&2	1 MEGOHM	28	SWITCH	38	20,000 OHM
5	6.5 μμf**	13	.001 μf	21-1&2	5,000 OHM	30	7.06 MILLIHY	39	150 OHM
6	250 μμf	14	27 OHM*	22	25.84 MICROHY	31-1&2	JACK	40	350 OHM
7	15 μμf	15	1,500 OHM	23	735 MICROHY	33	BINDING POST		
8-1&2	25 μμf	16	10,000 OHM	24	40 HENRYS *	34	POWER PLUGS		

*ON BC-221-N
REF. ITEM 14 IS 25 OHM.
REF. ITEM 24 IS 50 HENRIES
REF. ITEM 29 IS ANT. PLUG
REF. ITEM 32 & 33 BINDING POST

*ON EARLY MODEL BC-221-N
REF. ITEM 5 IS 8.5 μμf.

Frequency Meters BC-221-N and BC-221-AA, schematic diagram.

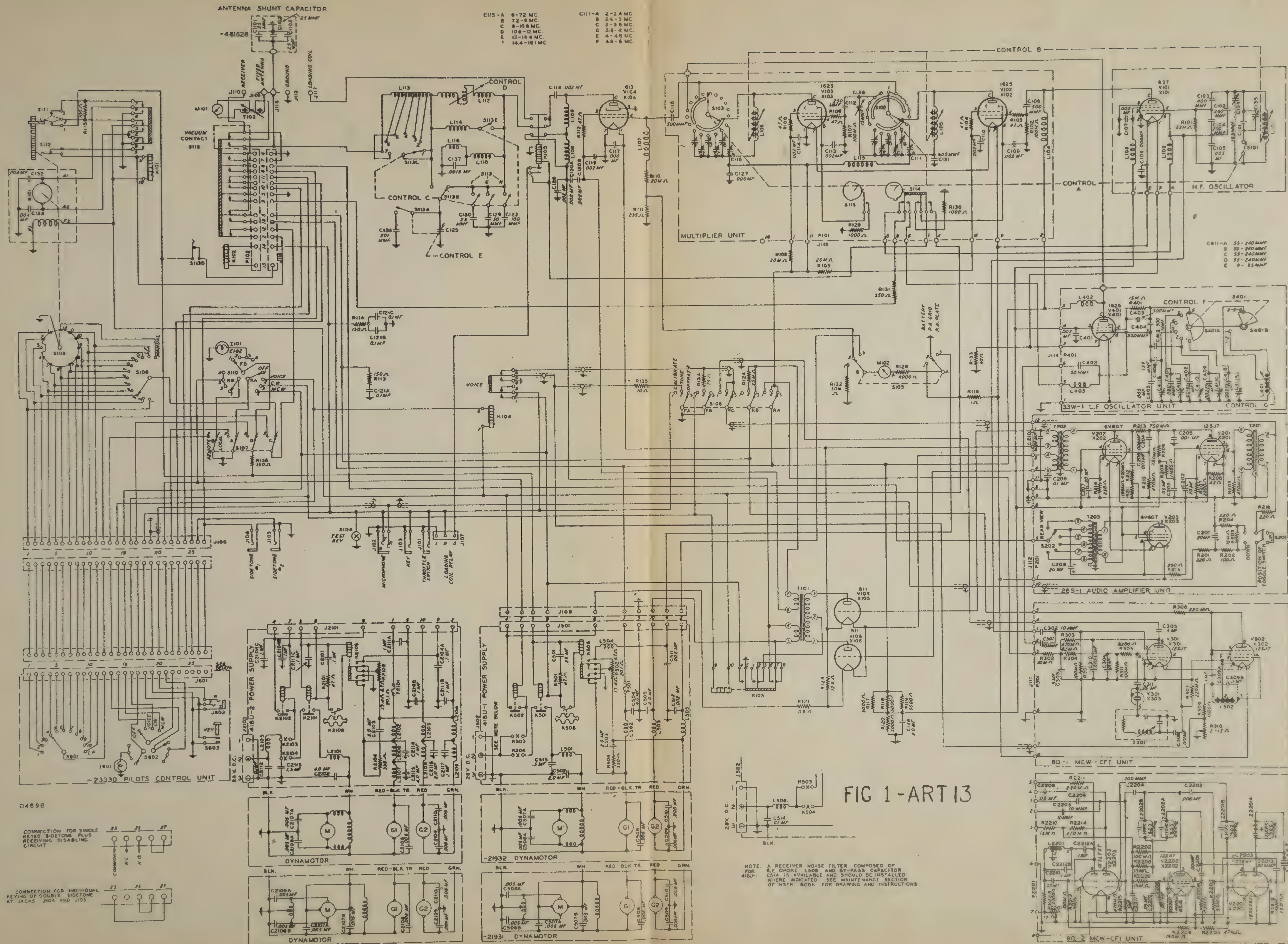
FIGURE 1 - 221



REF	DESCRIPTION	REF	DESCRIPTION	REF	DESCRIPTION	REF	DESCRIPTION	REF	DESCRIPTION	REF	DESCRIPTION
1	200 μμf	8	25 μμf	15	1,500 OHM	22	25.84 MICROHY	29	470,000 OHM	36	BATTERY TERM.
2	1.2 μμf	9-1&2	.001 μf	16-1&2	10,000 OHM	23	1.0 MILLIHY	30	7.06 MILLIHY	37	150 OHM
3-1-2&3	12 μμf	10-1&2	.25 μf	17	OUTPUT TRANS	24	150 HENRYS	31-1&2	JACK	38	10 μμf
4	10 μμf	11	.02 μf	18	50,000 OHM	25	CRYSTAL	32	BINDING POST	39	18,000 OHM
5	6.0 μμf	12	50 μμf	19	330,000 OHM	26	0.5 MEGOHM	33	BINDING POST	40	18,000 OHM
6	250 μμf	13	1,000 OHM	20	1 MEGOHM	27	SWITCH	34	POWER PLUGS	41	.002 μf
7	15 μμf	14	27 OHM	21-1&2	5,000 OHM	28	SWITCH	35	POWER JACKS		

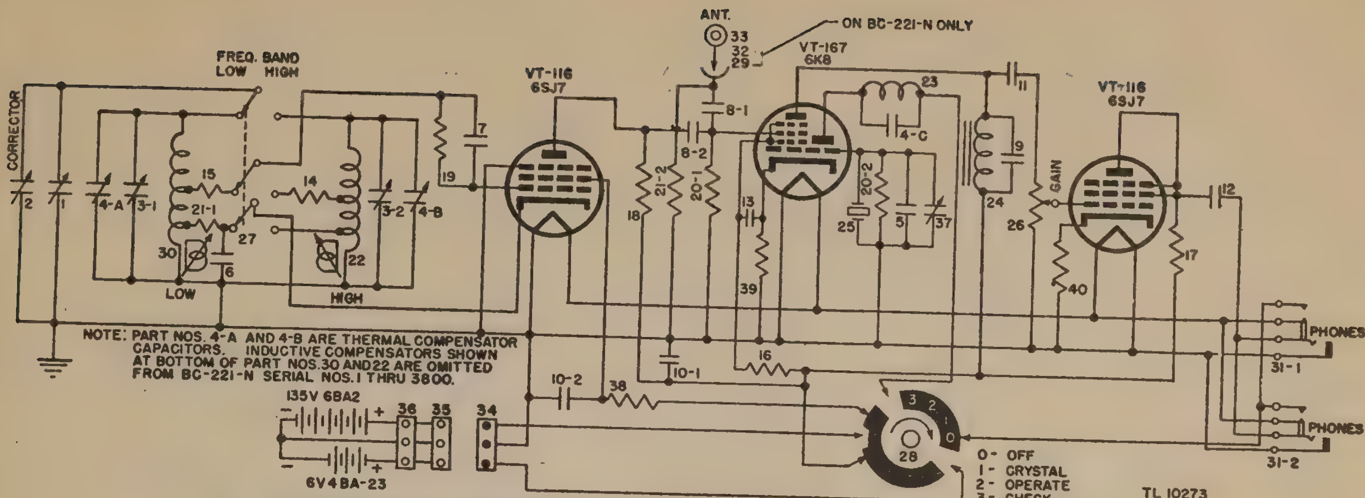
Frequency Meter BC-221-AK, schematic diagram.

FIGURE 2 - 221



ANTENNA SHUNT CAPACITOR
CONTROL B
CONTROL D
CONTROL C
CONTROL E
CONTROL A
CONTROL F
CONTROL G
MULTIPLIER UNIT
H.F. OSCILLATOR
33W-1 L.F OSCILLATOR UNIT
26S-1 AUDIO AMPLIFIER UNIT
8Q-1 MCW-CFI UNIT
8Q-2 MCW-CFI UNIT
-23330 PILOTS CONTROL UNIT
416U-2 POWER SUPPLY
416U-1 POWER SUPPLY
DYNAMOTOR
-21932 DYNAMOTOR
-21931 DYNAMOTOR
D4898
CONNECTION FOR SINGLE KEYED SIDETONE PLUS RECEIVING DISABLING CIRCUIT
CONNECTION FOR INDIVIDUAL KEYING OF DOUBLE SIDETONE AT JACKS J104 AND J105
NOTE: A RECEIVER NOISE FILTER COMPOSED OF R.F. CHOKE L506 AND BY-PASS CAPACITOR C514 IS AVAILABLE AND SHOULD BE INSTALLED WHERE INDICATED. SEE MAINTENANCE SECTION OF INSTR. BOOK FOR DRAWING AND INSTRUCTIONS

FIG 1-ART13



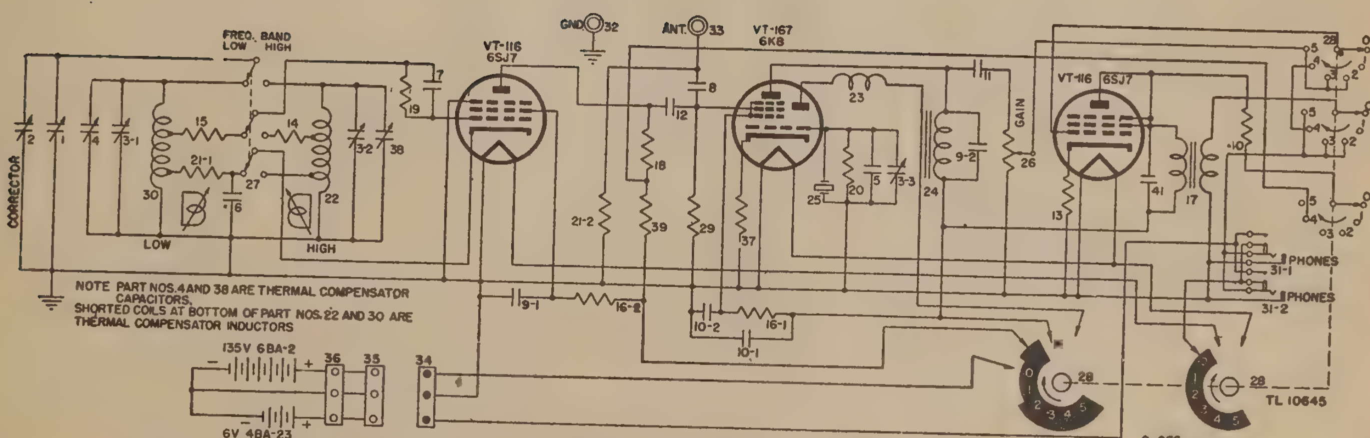
REF	DESCRIPTION	REF	DESCRIPTION	REF	DESCRIPTION	REF	DESCRIPTION	REF	DESCRIPTION
1	200 μμf	9	.002 μf	17	15,000 OHM	25	CRYSTAL	35	POWER JACKS
2	1.2 μμf	10–1&2	.1 μf	18	50,000 OHM	26	0.5 MEGOHM	36	BATTERY TERM.
3–1&2	15 μμf	11	.25 μf	19	330,000 OHM	27	SWITCH	37	12 μμf
4–A,B,C	10 μμf	12	2 μf	20–1&2	1 MEGOHM	28	SWITCH	38	20,000 OHM
5	6.5 μμf **	13	.001 μf	21–1&2	5,000 OHM	30	7.06 MILLIHY	39	150 OHM
6	250 μμf	14	27 OHM*	22	25.84 MICROHY	31–1&2	JACK	40	350 OHM
7	15 μμf	15	1,500 OHM	23	735 MICROHY	33	BINDING POST		
8–1&2	25 μμf	16	10,000 OHM	24	40 HENRYS *	34	POWER PLUGS		

*ON BC-221-N
REF. ITEM 14 IS 25 OHM.
REF. ITEM 24 IS 50 HENRIES
REF. ITEM 29 IS ANT. PLUG
REF. ITEM 32 & 33 BINDING POST.

*ON EARLY MODEL BC-221-N REF. ITEM 5 IS 8.5 μμf.

Frequency Meters BC–221–N and BC–221–AA, schematic diagram.

FIGURE 1 - 221



0-OFF
1-WARM-UP
2-CRYSTAL
3-OPERATE
4-MODULATE
5-CHECK
* MAKES CONTACT TO BOTH SEGMENTS OF SWITCH.

REF	DESCRIPTION	REF	DESCRIPTION	REF	DESCRIPTION	REF	DESCRIPTION	REF	DESCRIPTION	REF	DESCRIPTION
1	200 μμf	8	25 μμf	15	1,500 OHM	22	25.84 MICROHY	29	470,000 OHM	36	BATTERY TERM.
2	1.2 μμf	9–1&2	.001 μf	16–1&2	10,000 OHM	23	1.0 MILLIHY	30	7.06 MILLIHY	37	150 OHM
3–1–2&3	12 μμf	10–1&2	.25 μf	17	OUTPUT TRANS	24	150 HENRYS	31–1&2	JACK	38	10 μμf
4	10 μμf	11	.02 μf	18	50,000 OHM	25	CRYSTAL	32	BINDING POST	39	18,000 OHM
5	6.0 μμf	12	50 μμf	19	330,000 OHM	26	0.5 MEGOHM	33	BINDING POST	40	18,000 OHM
6	250 μμf	13	1,000 OHM	20	1 MEGOHM	27	SWITCH	34	POWER PLUGS	41	.002 μf
7	15 μμf	14	27 OHM	21–1&2	5,000 OHM	28	SWITCH	35	POWER JACKS		

Frequency Meter BC–221–AK, schematic diagram.

FIGURE 2 - 221

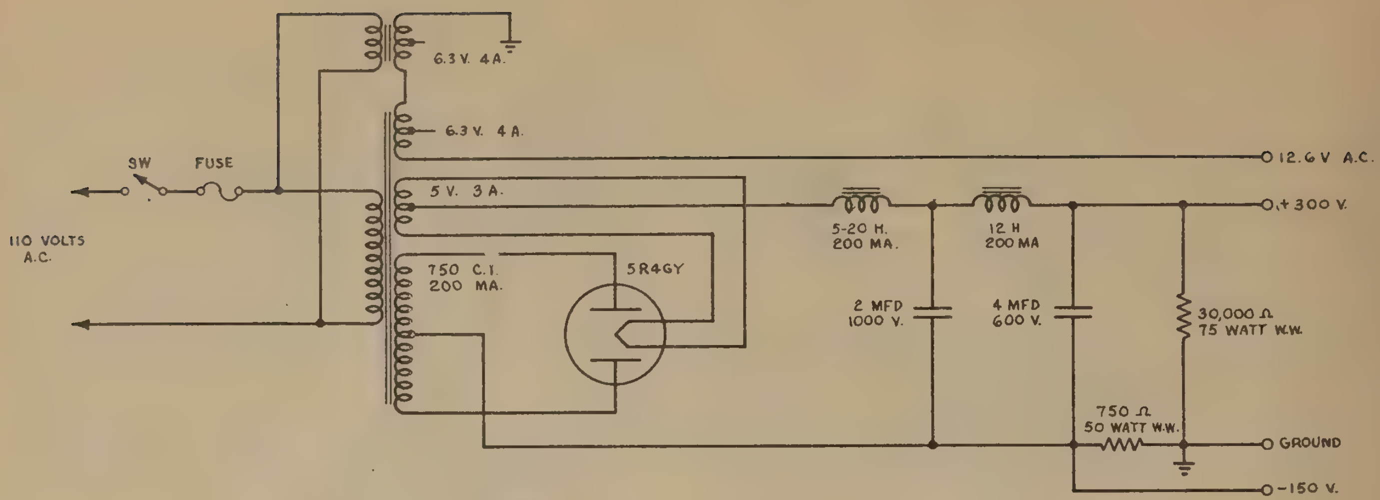
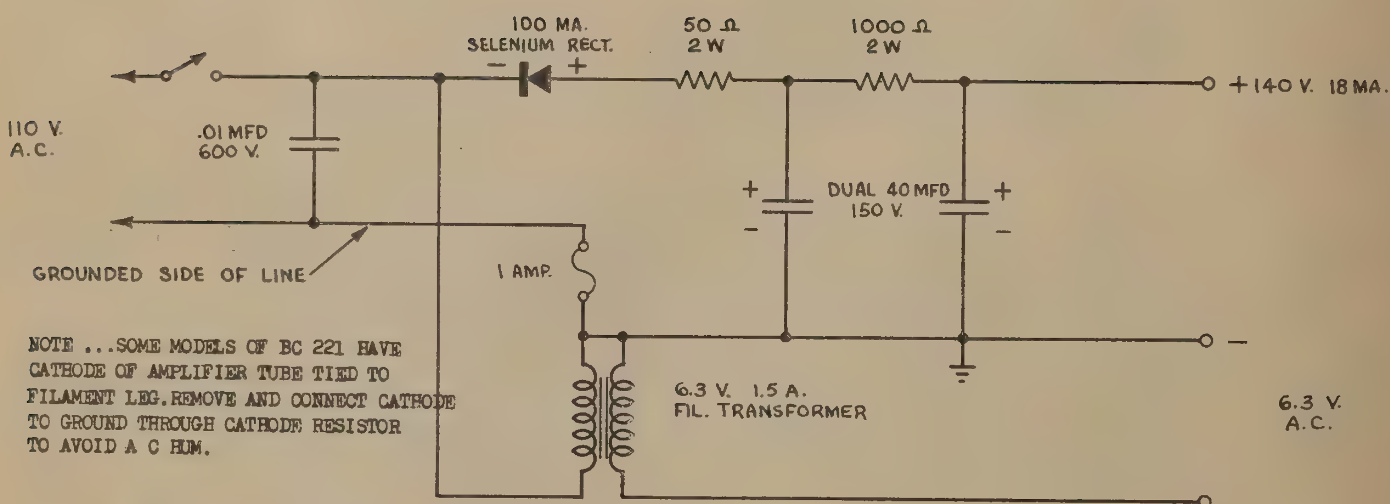


FIGURE 10 – 522

POWER SUPPLY SCR-522

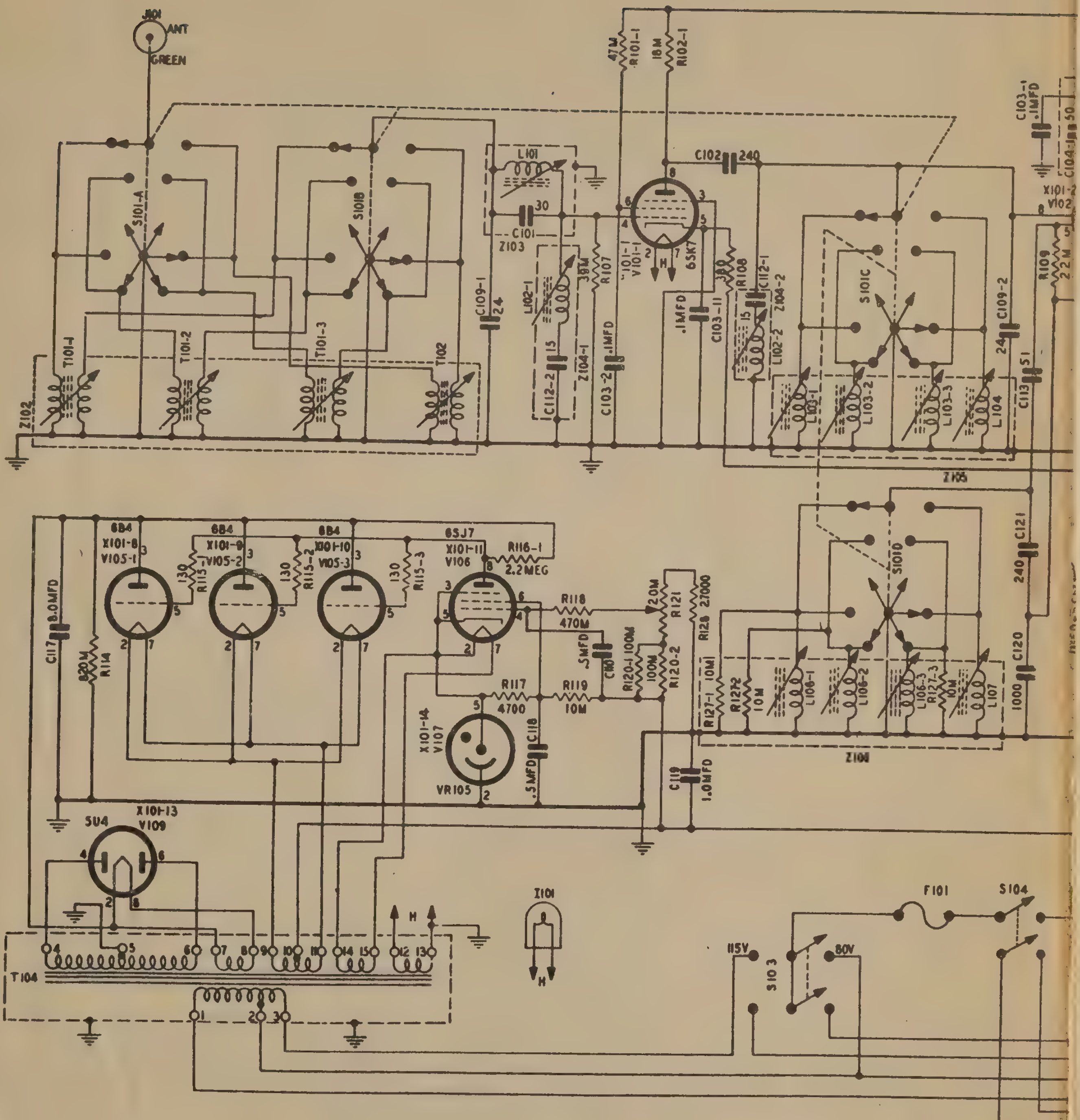


NOTE ...SOME MODELS OF BC 221 HAVE CATHODE OF AMPLIFIER TUBE TIED TO FILAMENT LEG. REMOVE AND CONNECT CATHODE TO GROUND THROUGH CATHODE RESISTOR TO AVOID A C HUM.

FIGURE 3 – 221

A.C. POWER SUPPLY FOR BC-221

PN-


J101
ANT
GREEN
S101-A
S101B
S101C
S101D
T101-1
T101-2
T101-3
T102
Z102
L101
C101
30
Z103
L102-1
C112-2
15
Z104-1
C109-1
24
R107
38M
C103-2
.1MFD
47M
R101-1
18M
R102-1
C102
240
V101-1
6SK7
C103-1I
.1MFD
380
R108
C112-1
Z104-2
L102-2
L103-1
L103-2
L103-3
L104
C113
51
C109-2
Z105
C103-1
.1MFD
C104-1
50
X101-2
V102
R109
2.2M
6B4
X101-8
V105-1
6B4
X101-9
V105-2
6B4
X101-10
V105-3
130
R115-1
R115-2
R115-3
6SJ7
X101-11
V106
R116-1
2.2MEG
R118
470M
.5MFD
C110
R120-1
100M
R120-2
20M
R121
R128
27000
R127-1
10M
R127-2
10M
L106-1
L106-2
L106-3
R127-3
L107
Z106
C121
240
C120
1000
C117
8.0MFD
820M
R114
R117
4700
R119
10M
X101-14
V107
VR105
C118
.5MFD
C119
1.0MFD
5U4
X101-13
V109
T104
I101
H
F101
S104
115V
80V
S103

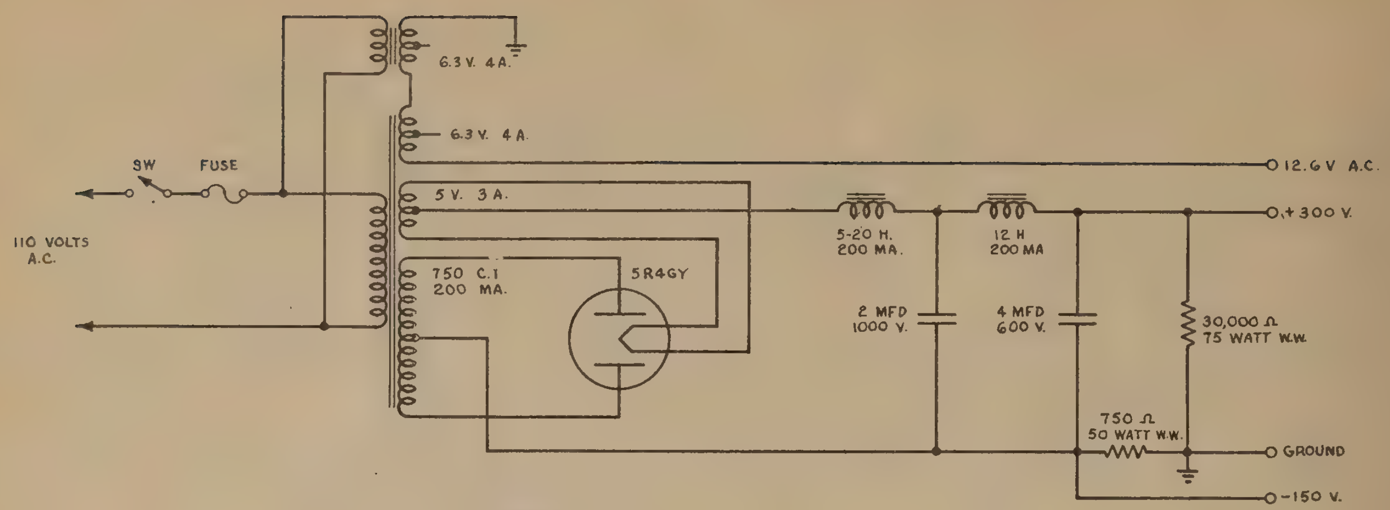


FIGURE 10 - 522

POWER SUPPLY SCR-522

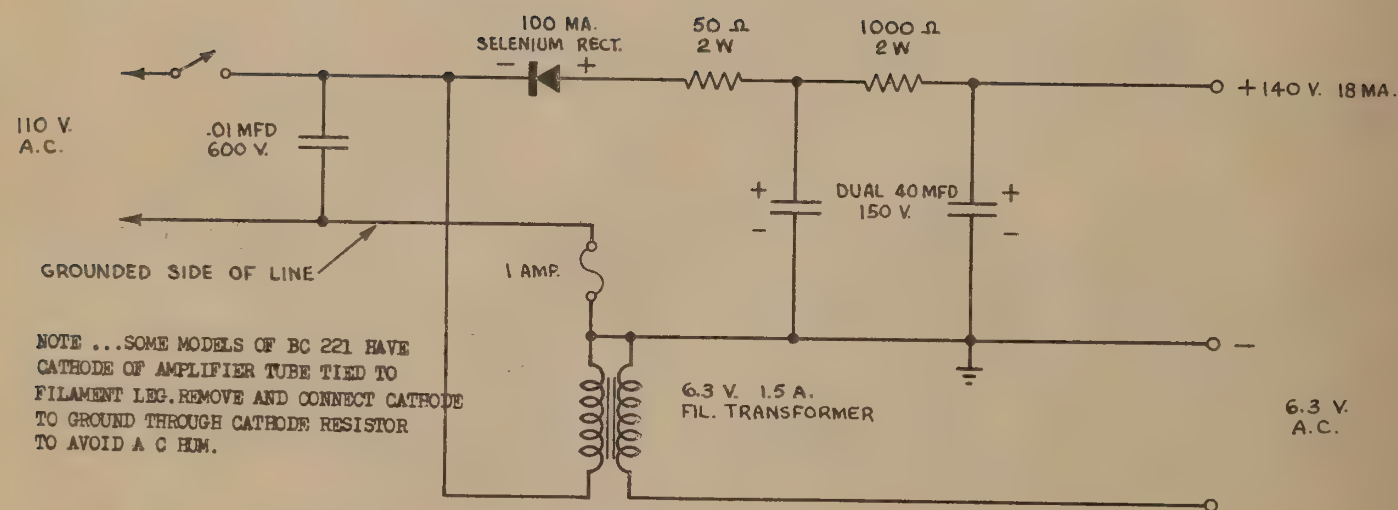
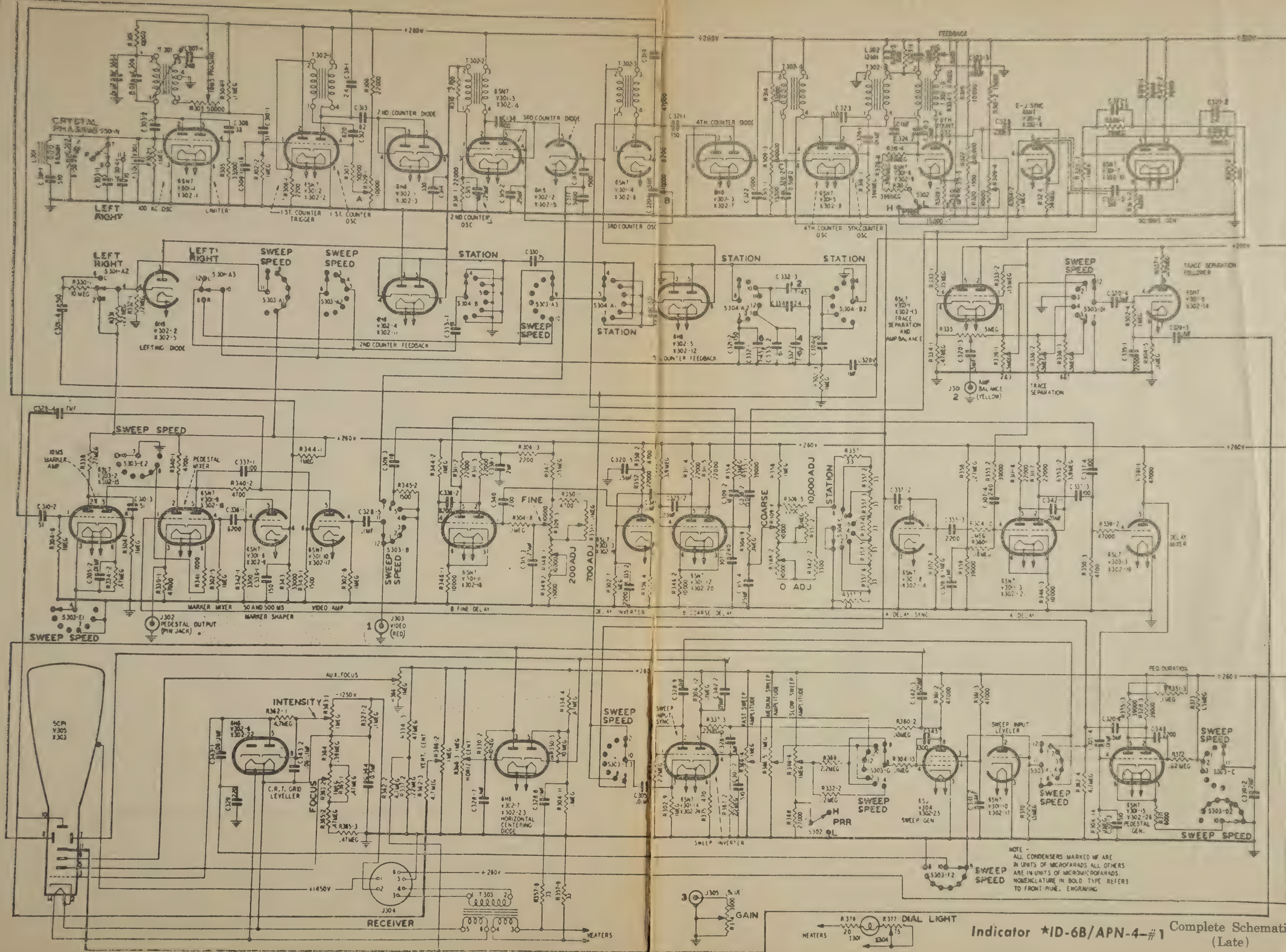


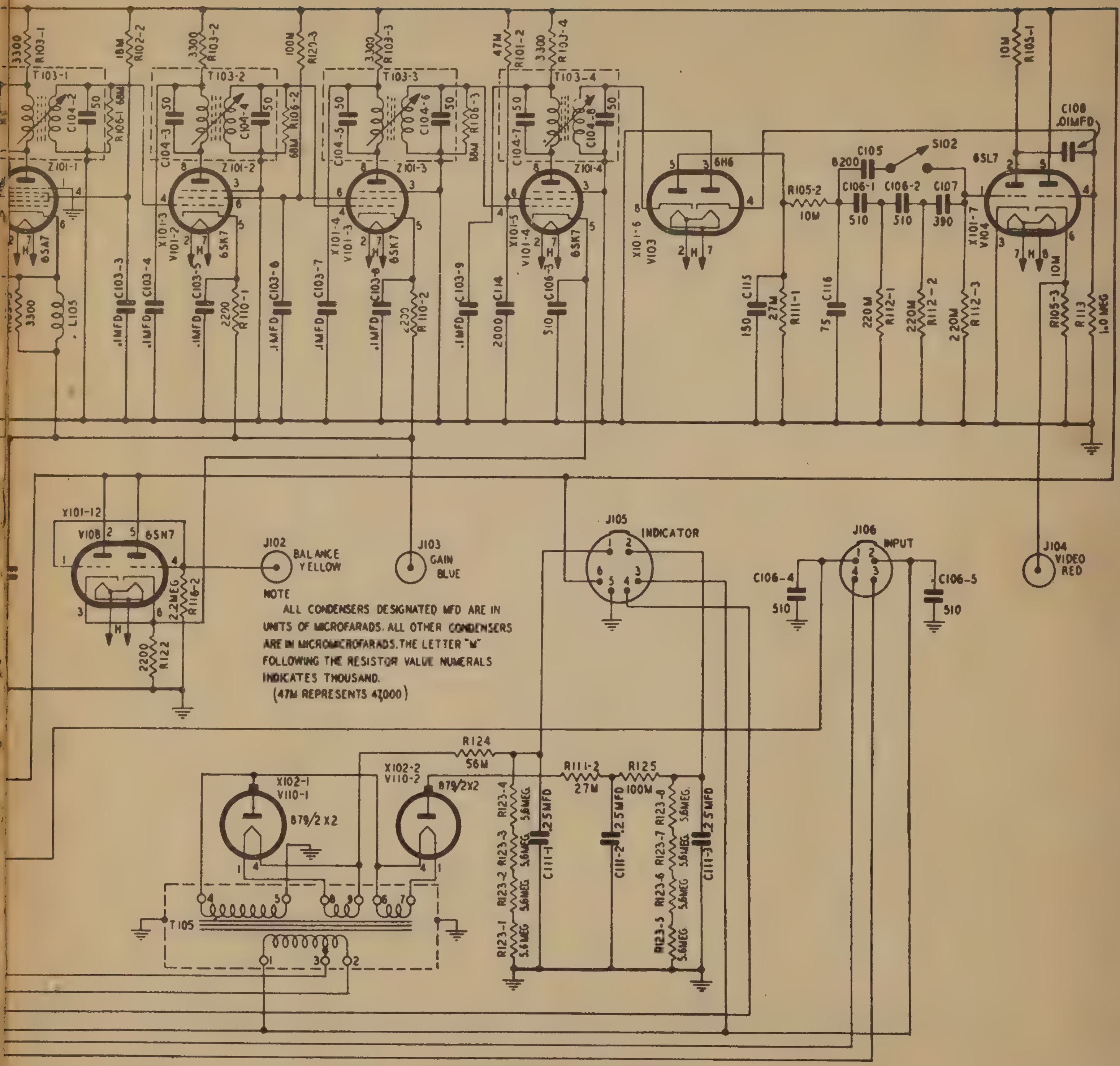
FIGURE 3 - 221

A.C. POWER SUPPLY FOR BC-221

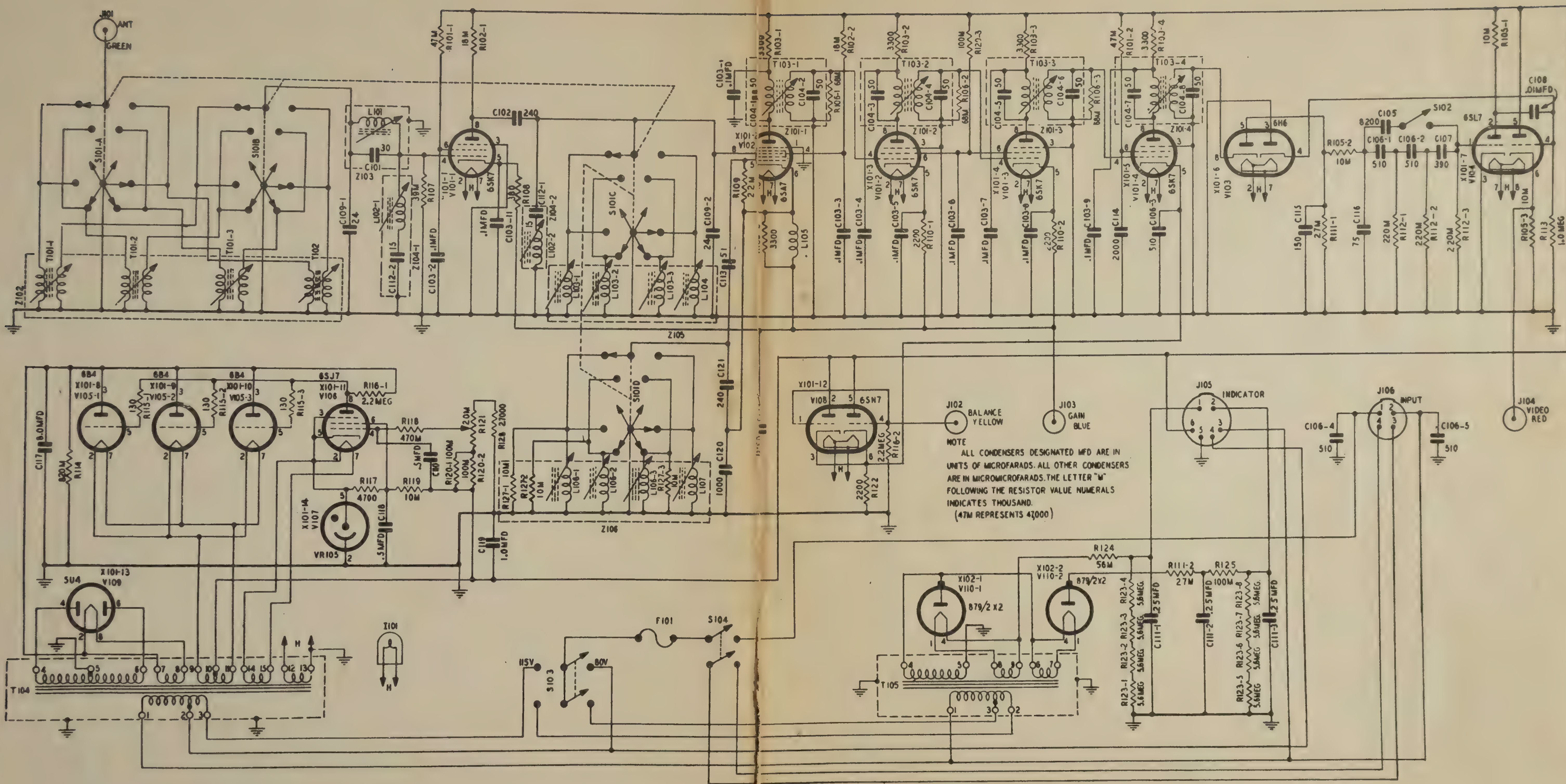
APN-4-#1



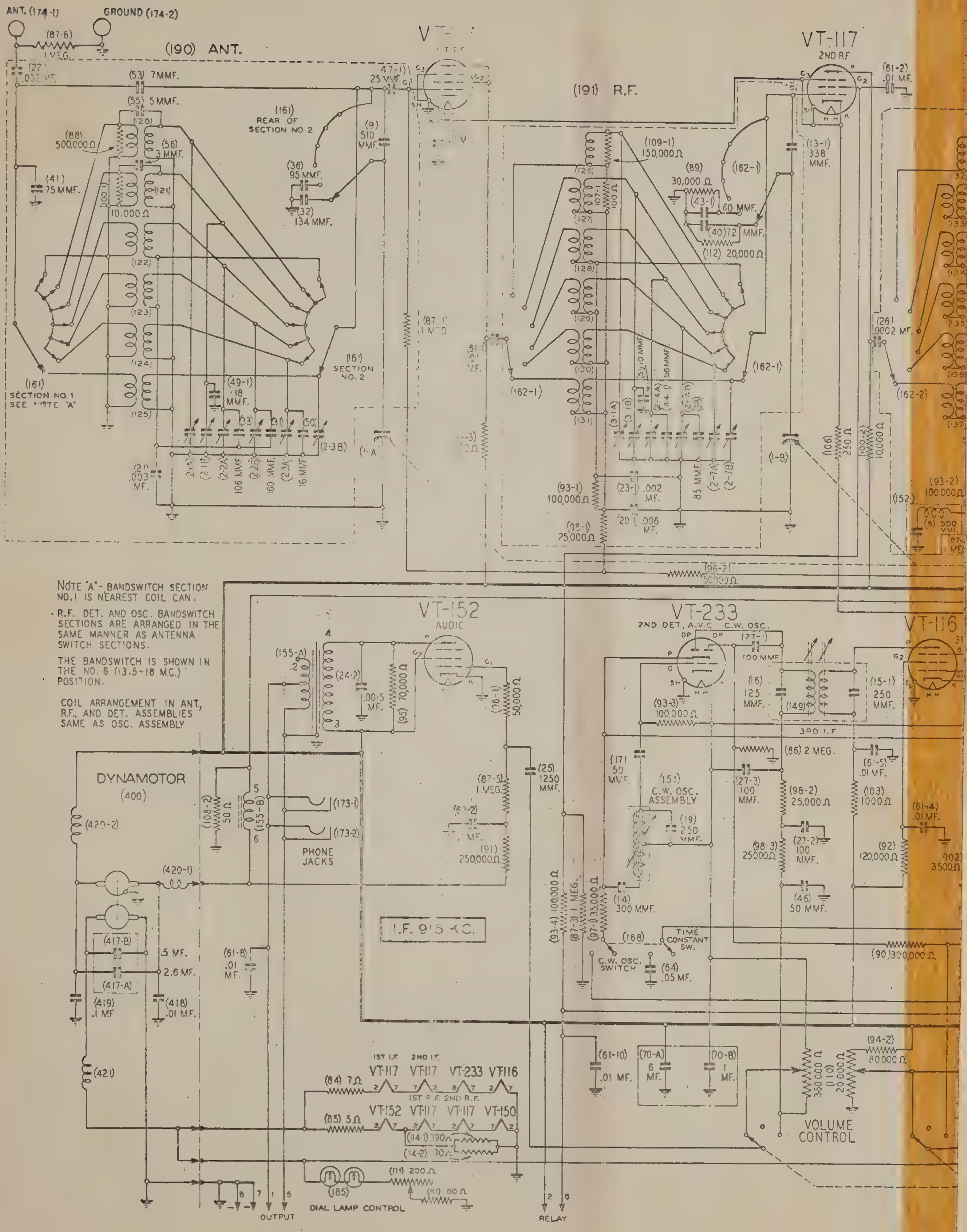
Indicator *ID-6B/APN-4-#1 Complete Schematic (Late)



Radio Receiver *R-9B/APN-4—#2 (Modification IV)—Complete Schematic (Late)



Radio Receiver *R-9B/APN-4—#2 (Modification IV)—Complete Schematic (Late)



ANT. (174-1)
GROUND (174-2)
(190) ANT.
(191) R.F.
VT-117
2ND RF
(161) REAR OF SECTION NO. 2
(161) SECTION NO. 2
(161) SECTION NO. 1 SEE NOTE "A"
NOTE "A" - BANDSWITCH SECTION NO. 1 IS NEAREST COIL CAN.
R.F. DET. AND OSC. BANDSWITCH SECTIONS ARE ARRANGED IN THE SAME MANNER AS ANTENNA SWITCH SECTIONS.
THE BANDSWITCH IS SHOWN IN THE NO. 6 (13.5-18 M.C.) POSITION.
COIL ARRANGEMENT IN ANT., R.F., AND DET. ASSEMBLIES SAME AS OSC. ASSEMBLY
VT-152
AUDIO
VT-233
2ND DET., A.V.C. C.W. OSC.
VT-116
3RD I.F.
DYNAMOTOR
(400)
PHONE JACKS
I.F. 915 KC.
(151) C.W. OSC. ASSEMBLY
TIME CONSTANT SW.
C.W. OSC. SWITCH
VOLUME CONTROL
1ST I.F.
2ND I.F.
1ST R.F.
2ND R.F.
DIAL LAMP CONTROL
OUTPUT
RELAY

BC 348-Q

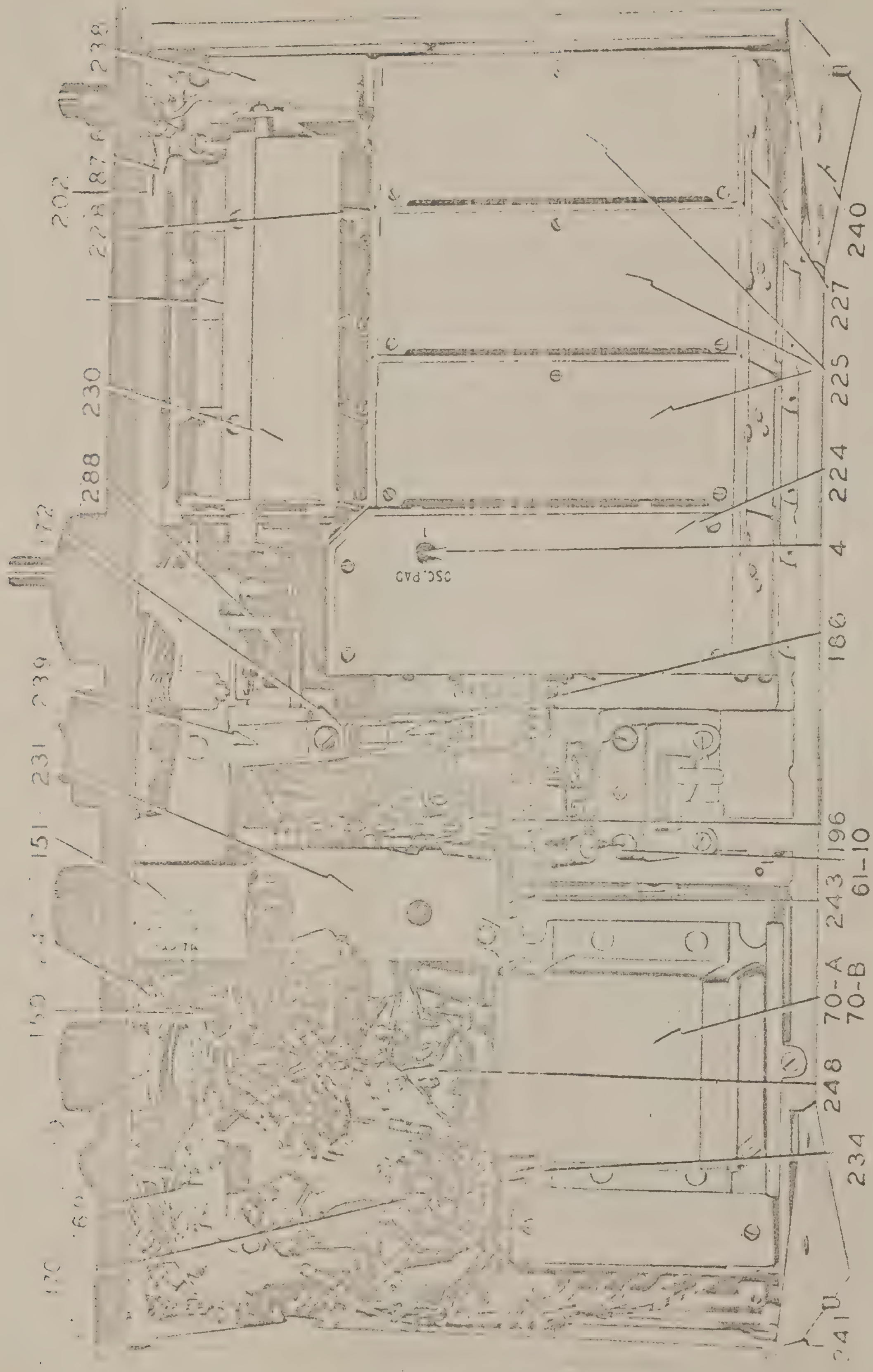


Figure 36 — Radio Receiver BC-348-Q, Bottom View of Chassis

BC 348-Q

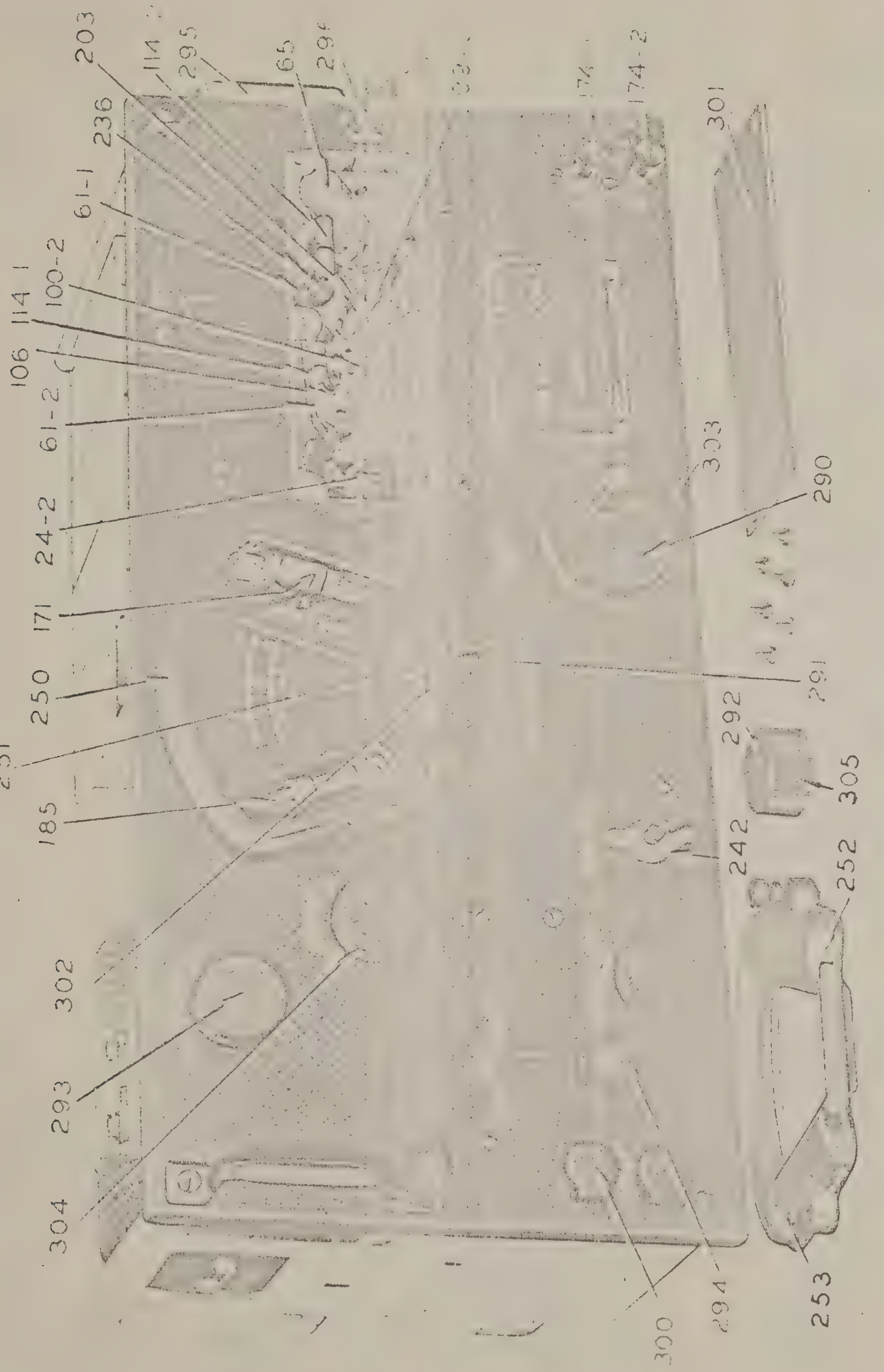
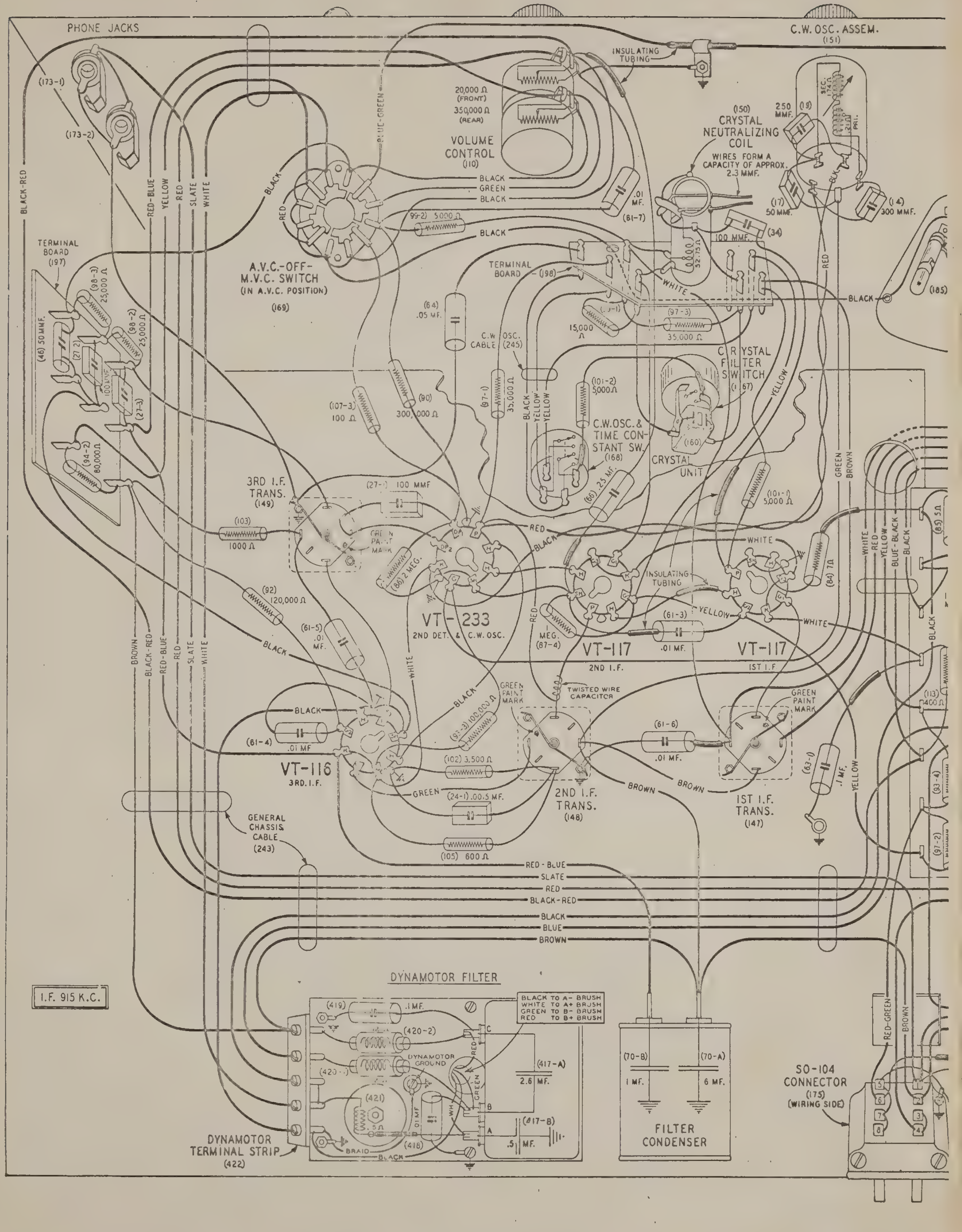


Figure 35 — Radio Receiver BC-348-Q, Front View


PHONE JACKS
C.W. OSC. ASSEM. (151)
INSULATING TUBING
VOLUME CONTROL (110)
CRYSTAL NEUTRALIZING COIL (150)
WIRES FORM A CAPACITY OF APPROX. 2.3 MMF.
A.V.C.-OFF-M.V.C. SWITCH (IN A.V.C. POSITION) (169)
TERMINAL BOARD (197)
TERMINAL BOARD (198)
C.W. OSC. CABLE (245)
CRYSTAL FILTER SWITCH (167)
C.W. OSC. & TIME CONSTANT SW. (168)
CRYSTAL UNIT
3RD I.F. TRANS. (149)
VT-233 2ND DET. & C.W. OSC.
VT-117 2ND I.F.
VT-117 1ST I.F.
VT-116 3RD. I.F.
TWISTED WIRE CAPACITOR
2ND I.F. TRANS. (148)
1ST I.F. TRANS. (147)
GENERAL CHASSIS CABLE (243)
I.F. 915 K.C.
DYNAMOTOR FILTER
BLACK TO A- BRUSH
WHITE TO A+ BRUSH
GREEN TO B- BRUSH
RED TO B+ BRUSH
DYNAMOTOR GROUND
DYNAMOTOR TERMINAL STRIP (422)
FILTER CONDENSER
SO-104 CONNECTOR (175) (WIRING SIDE)

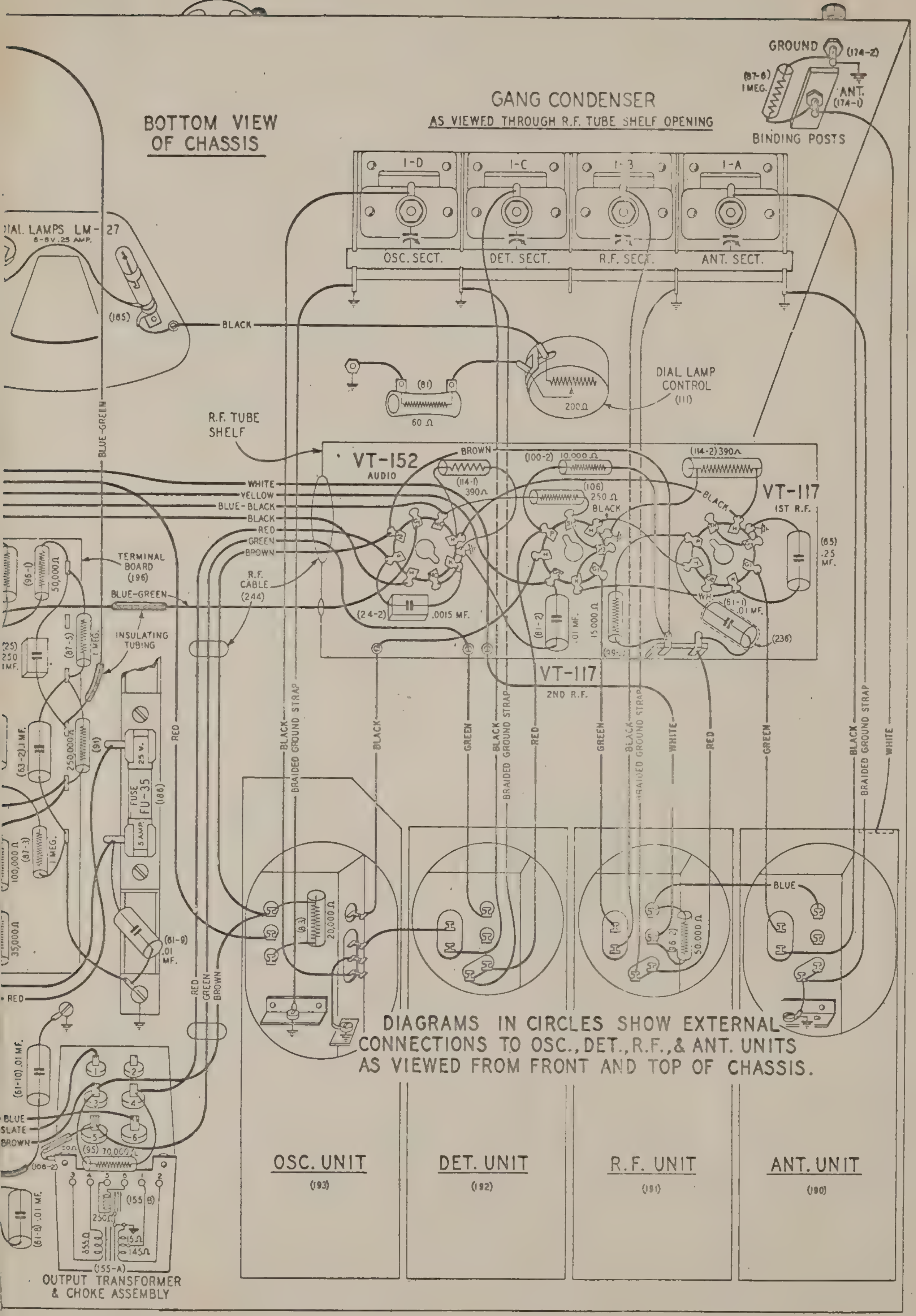


Figure 34 — Radio Receiver BC-348-Q Wiring Diagram of Chassis

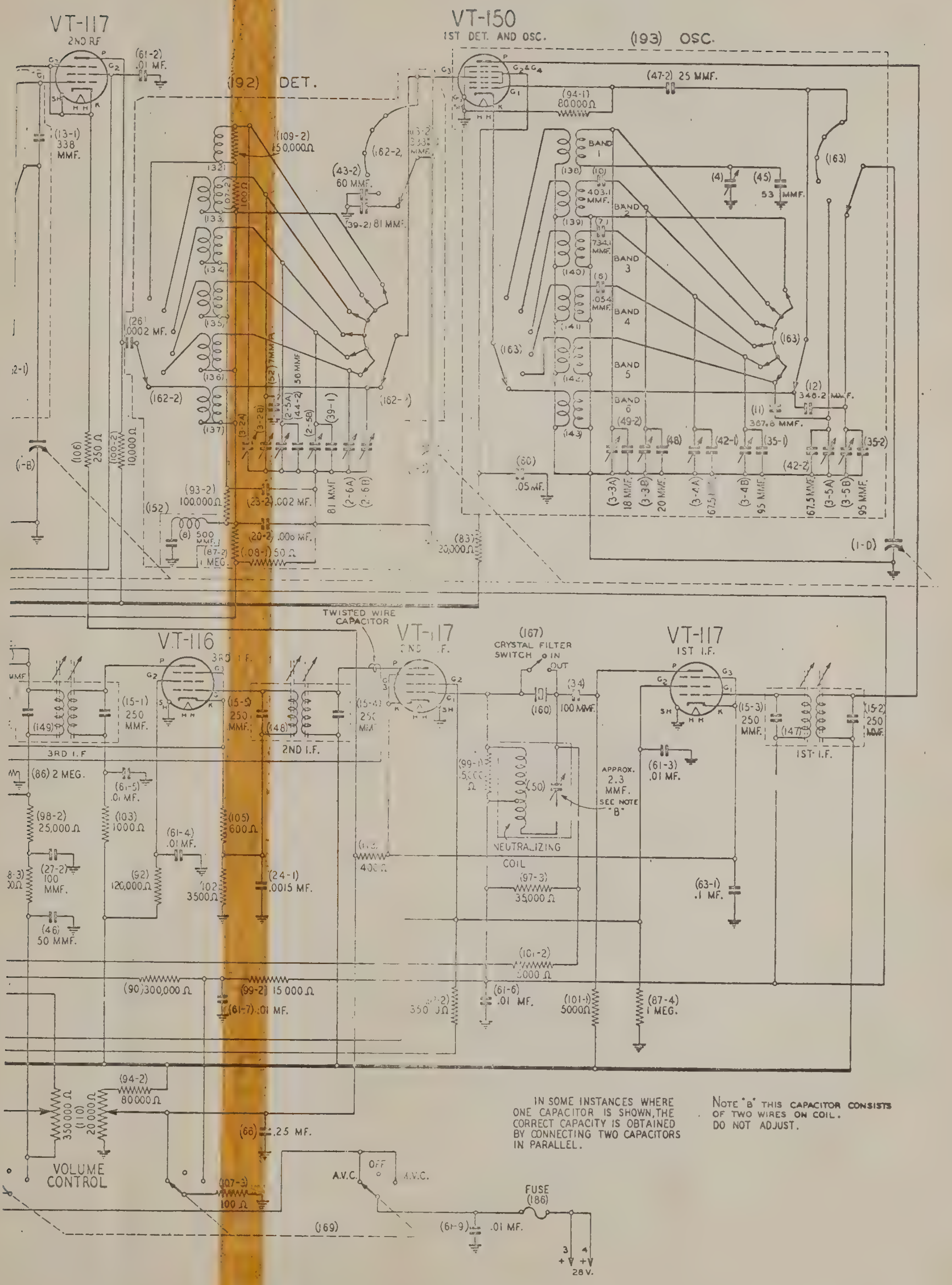


Figure 33 — Radio Receiver BC-348-Q Schematic Diagram

SCR-288, SCR-300, SCR-506, SCR-522, SCR-578, SCR-585, SCR-593, SCR-608, SCR-610, SCR-624, SCR-628, SPR-1, SPR-2, TBS, TBW, TBX, TBY, TCK, TCS, TG-34, TS-34/AP, TS-251/UP, VRC, VVX-1.

The other CQ book, the *Surplus Conversion Handbook* by Tom Kneitel K3FLL, ($3) contains conversion on these pieces of gear: ARC-1, ARC-3 , ARC-4, ARC-5, ARC-36, ARC-49, ART-13, ATA, ATC-1, BC-191F, BC-224, BC-312, BC-314, BC-343, BC-344, BC-348, BC-375E, BC-453, BC-454, BC-455, BC-457A, BC-458A, BC-459A, BC-603, BC-604, BC-620, BC-624A, BC-625A, BC-659, BC-669, BC-683, BC-684, BC-696A, BC-779, BC-794, BC-946, BC-1004, BC-1068A, CBY-52232, PE-73, PE-103, R-129/U, RAX-1, SCR-177, SCR-188, SCR-193, SCR-274N, SCR-399, SCR-499, SCR-508, SCR-509, SCR-510, SCR-522, SCR-528, SCR-542, SCR-608, SCR-609, SCR-628.

. . . WA1CCH

Cheap Coil or Choke Forms

Not liking to pay the price for Z-144's, I consulted the May '62 issue of 73, page 99, to obtain data for a 2 meter choke coil. The form size specified was 5⁄16 inch, not a standard size around my shack. The cost of commercial forms of this size was out of the question (when you're as Scotch as I am). Next step: take a 5⁄16 inch diameter polystyrene rod and cut a section to required length for winding the choke.

To make the form, prepare polystyrene rod as shown in the photo. Then hold section of polystyrene rod in vise or some other secure manner. Now take lengths of #18 or #20 wire, depending on strength desired in the leads. Place length of wire against end of polystyrene rod in center, carefully apply enough heat with soldering iron to cause the wire to penetrate deep enough into the polystyrene rod for good mechanical strength, then remove heat and let set. Repeat for other end.

After both lengths of wire are firmly set, wind desired choke. Care should be exercised in soldering coil wire to wire leads. A heat sink is recommended to avoid excessive movement of leads.

This inexpensive method of making rf chokes is used quite successfully at my QTH.

. . . Gary Smith WAØASA

Paul Franson WA1CCH
Peterborough, N.H.

Guide to Surplus Conversions

Many articles have been written—and published—about surplus. These articles have ranged from simple suggestions to complete and detailed conversions such as the one by WA6BSO in this issue of 73. But these conversions are often hard to find; this is well demonstrated by the many articles on surplus that are duplications of other articles.

But it's not really that hard to find surplus conversions. Roy Pafenberg W4WKM has compiled a list of all the conversions he could find in the popular electronics magazines since World War II in the *Index to Surplus* available from many distributors or 73 for $1.50. But the *Index* does not list the articles that have appeared in the various surplus *handbooks* that have been published. That's what this article is for. I've listed the pieces of equipment covered in the six surplus radio handbooks now available. The conversions differ greatly in completeness, so it's suggested that you take a look at any books of interest before you make big plans.

Editors and Engineers

Editors and Engineers, P.O. Box 68003, New Augusta, Indiana, have published three *Surplus Radio Conversion Manuals* by Evenson and Beach and the *Surplus Handbook, Vol. I* by W6NJV and W6NJE. Each costs $3. Here are the pieces of equipment covered in each manual:

Surplus Radio Conversion Manual, Vol. I. BC-221, BC-342, BC-312, BC-348, BC-412, BC-645, BC-646, SCR-274 (BC-453A and BC-457A series), SCR-522, TBY, PE-103A, BC-1068A/1161A.

Surplus Radio Conversion Manual, Vol. II. BC-454, AN/APS-13, BC-457, ARC-5, GO-9/TBW, BC-946B, BC-375, LM, TA-12B, AN/ART-13, AVT-112A, AM-26/AIC, ARB.

Surplus Radio Conversion Manual, Vol. III. APN-1, APN-4, ARC-4, ARC-5, ART-13, BC-191, BC-312, BC-342, BC-348, BC-375, BC-442, BC-453, BC-455, BC-456-9, BC-603, BC-624, BC-696, BC-1066, BC-1253, CBY-5200, COL-43065, CRC-7, DM-34, DY-2, DY-8, FT-241A, MD-7/ARC-5, R-9/APN-4, R-28/ARC-5, RM-52-53, RT-19/ARC-4, RT-159, SCR-274N, SCR-508, SCR-522, SCR-528, SCR-538, T-15 to T-23/ARC-5, URC-4, WE701A.

Surplus Handbook, Vol I. This book, subtitled, *Receivers and Transceivers*, is composed of schematics and pictures of the following gear. It doesn't give conversions. APN-1, APS-13, ARB, ARC-4, LF and VHF ARC-5, ARN-5, ARR-2, ASB-7, BC-222, BC-312, BC-314, BC-342, BC-344, BC-348, BC-603, BC-611, BC-624 (SCR-522), BC-652, BC-654, BC-659, BC-669, BC-683, BC-728, BC-745, BC-764, BC-779, BC-794, BC-923, BC-1000, BC-1004, BC-1066, BC-1206, BC-1306, BC-1335, BC-AR-231, CRC-7, DAK-3, GF-11, Mark II, MN-26, RAK-5, RAX, RAL-5, Super Pro, TBY, TCS, VT tube cross index.

CQ Handbooks

CQ has two handbooks on surplus out. They can be ordered from CQ, 14 Vanderventer Avenue, Port Washington, N.Y. The first book, the *Surplus Schematics Handbook*, by Ken Grayson W2HDM, costs $2.50, and contains schematics and short comments about this gear: APA-38, APN-1, APR-1, APR-2, APS-13, ARB, ARC-1, ARC-3, ARC-4, ARC-5, ARC-5 VHF, ARJ-ARK-ATJ, ARN-7, ARR-2, ART-13, ASB, AS-81-GR, ATK, BC-AR-231, BC-189, BC-191, BC-221, BC-312, BC-314, BC-342, BC-344, BC-348, BC-375, BC-438, BC-474A, BC-603, BC-610, BC-611, BC-620, BC-640, BC-645, BC-652, BC-653, BC-659, BC-683, BC-684, BC-728, BC-733, BC-745, BC-779, BC-794, BC-906, BC-969, BC-1000, BC-1004, BC-1023, BC-1206, BC-1335, BN, BP, C3, CRC-7, CRO-208, CRT-3, DAE, F3, GF-11, GO-9, GRR-5, I-122, I-177, I-208, JT-350A, LM, Mark II, MD-7, MN-26, PRC-6, PRS-3, R-174, RAK, RAL, RAO-7, RAS, RAX, RBH, RBL, RBM, RBS, RC-56, RC-57, RDC, RDR, RDZ, RU-16, SCR-274, SCR-284,

Bibliography of Articles on Equipment for Frequencies of 50MC and Above

From CQ Magazine

Low Loss HF Superhet, BC 406	Feb. 1946
Lighthouse Preselector	March 1947
2 Meter Conversion of the 1068A	June 1947
Modification of the SCR522 for 2 Meters	July 1947
Increasing the Audio Output of the SCR522	May 1948
Lighthouse tube 420 Mc Transmitter	Sept. 1948
Low Noise VHF Converter	March 1949
More on VHF Converters	Nov. 1949
Putting the SCR522 on 6 Meters	Feb. 1949
Improving the BC624 Noise Limiter	July 1949
2 Meter R-9'er	Dec. 1949
Ultimate in Converters	Sept. 1949
Wide Range VHF Converters	Aug. 1949
The 6 and 2	May 1949
Putting Surplus to Work on the 420 Mc Band	Feb. 1950
More Gain with 30 Elements	Nov. 1950
Simplicity on Six	Sept. 1950
Walkie-Talkie for 144 Mc	May 1950
Wide Spread Twin Five	March 1950
Zig-Zag Array (Vertical Polarization)	June 1950

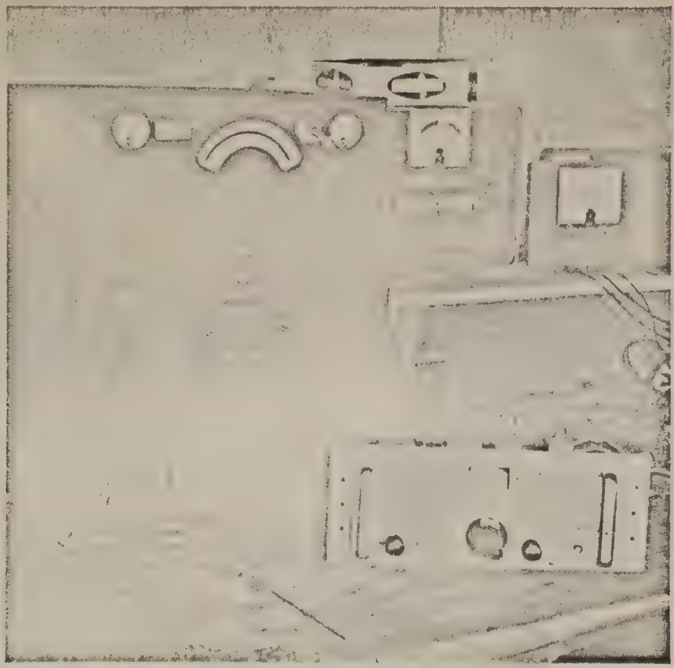
From QST Magazine

Compact Superhet for 144 Mc	Oct. 1947
420 is Fun	Nov. 1947
Improved Receiver for 2 Meters	March 1947
Lets Start Right on 1 1/4	Dec. 1947
Low Cost 6 Meter Fone	March 1947
Low Cost 2 Meter Transmitter	April 1947
Operating the BC 645 on 420 Mc	Feb. 1947
Put Em' Push-Push	Jan. 1947
Practicle Crystal Control for 144 Mc Mobile Operation	Oct. 1947
2400 Mc Oscillator Cavity	Oct. 1947
VHF Crystal Oscillator	Nov. 1947
Adapting the Cathod Coupled Preamplifier to 144 Mc (H & K)	Aug. 1948
Band Pass Converter for 144 Mc	Jan. 1948
Better Reception for 2 Meter Mobile	April 1948
Coaxial Line Receiver for 220 Mc	June 1948
Coaxial Line VHF Receivers	March 1948
Compact 20 Watt Rig for 50 Mc	April 1948
Crystal Control on 220 Mc	May 1948
Fun on 420 with the BC788	July 1948
Grounded Grid Technique on 50 Mc	Feb. 1948

High Power on 220 Mc	Aug. 1948
Hot Converter for 220 Mc	Oct. 1948
Mobile Midget for 144 Mc	Feb. 1948
Novel Converter for 144 Mc	Sept. 1948
Operating the APS13 on 420 Mc	May 1948
Oscillator for the 1215 Mc Band	April 1948
Simple Crystal Control on 144 Mc	Oct. 1948
So Its Hard to get on VHF	Nov. 1948
Tripling to 420	June 1948
VHF Mans VFO	
ABFO for the 522 Receiver	June 1948
Improved 144 Mc Reception (SCR522)	Sept. 1948
Better Results with the 522	April 1949
Cascode Converter for 144 MC	June 1949
City Slicker Array for 144 Mc	Nov. 1949
Compact Converter for 6 & 10	Feb. 1949
Doorknob Oscillator for 420 Mc	Jan. 1949
Making the Higher Frequencies Pay Off	Jan. 1949
Noise Generator Technique for the VHF Man	Aug. 1949
Simple Gear for the 420 MC Beginner	May 1949
Simple System for 2 Meter NFM	Jan. 1949
Simplicity on 6	Aug. 1949
Using the Cascode on 50MC	March 1949
VHF Sandwich	June 1949
450 Watts on VHF	Sept. 1949
6J6 as a Doubler	Jan. 1949
Two Unusual 144 Mc Antennas	Dec. 1950
Mobile Converter for 144 Mc	Aug. 1950
Utilizing the 826	May 1950
AVHF Frequency Meter	Oct. 1950
2 Meter Station for the Novice	Feb., March & April 1950
Better Results on 420	Aug. 1950
Compact 2 Meter Station for Mobile Use	May 1950
Crystal Controlled Converters for VHF	Sept. 1950
Using the BC-221 Frequency Meter at VHF	Jan. 1950

It will be noted that this Bibliography is incomplete due to the fact that not all issues of CQ Magazine were available. Also this list does not include any references from Radio News or Electronics which contain many articles of Merit on VHF equipment. Also articles in the ARRL Handbooks and Radio Handbooks are not listed in this Bibliographyg

VHF News —
2433 Elder Lane
Franklin Park
Ill
$2.00 per year



View of the LR-1 direct reading frequency meter, in use. Note that the two coaxial connectors to the left and right of the meter have been changed to BNC fittings.

THE LR-1 FREQUENCY METER

BY SAM KELLY,* W6JTT

The author describes how to get the LR-1 working and how to operate it. This fine direct reading frequency meter is becoming available on the surplus market in greater quantity.

One of the few interesting surplus items to reach the ham market in the past year is the LR-1 frequency meter. It is very attractive to the ham since in addition to its heterodyne frequency meter function it will generate and measure audio frequencies up to 5.5 kc and provide crystal calibrator outputs of 10, 20 and [illegible] accuracy is specified as ± 0.003% [illegible] to 30 mc. A multiplier chart is sup- [illegible] or use of harmonics up to 60 mc.

To place the LR-1 in operation remove the cover from the terminal and filter assembly and connect 115 v. 60 cycles to the terminals marked "60." These terminals should have a green and a green/yellow wire connected to them. Install fuse F_{101} in the fuse clips whose voltage markings most closely approximate the line voltage in your shack. The r.f. input and output connectors are impossible to match and should be replaced with BNC type UG-604/U.

*12811 Owen Street, Garden Grove, California 92641.

Operation of the LR-1 is more involved than using a LM or BC-221. It is a direct reading instrument requiring no calibration book, but the operation is unique.

Crystal Calibrator

The calibrator consists of a 100 kc crystal oscillator accurate to one part in 10^5. A capacitor is provided for adjusting the oscillator against a primary standard such as WWV or WWVH. This adjustment (C_{102}) shouldn't be touched unless it is necessary. If you do adjust the oscillator use an oscilloscope to compare the beat notes—don't rely upon your ears.

Locked to the crystal oscillator is an astable multivibrator which provides 10 and 20 kc calibration markers. To determine if the multivibrator is properly dividing the 100 kc signal proceed as follows:

Remove amplifier tube V_{102}. Place the CALIBRATOR switch in the 100 kc position. Using the heterodyne frequency meter direct reading dial check for the 200 kc harmonic. It should be with-

in ± 1 kc of the 200 kc dial marker. If not, adjust R_{114} until it is. Replace V_{102} and allow the tube to warm up. Place the RANGE SELECTOR switch in the 1.33—1.87 mc range. Vary the HFM tuning control noting the dial reading on two successive 100 kc harmonics. Place the CALIBRATOR switch in the 20 kc position and count the number of zero beat points between the two 100 kc readings. It should be five. If not, adjust R_{113} until it is. Repeat the above procedure for the 10 kc position adjusting R_{112} until there are ten zero beat points between the two 100 kc readings.

To use the crystal calibrator for external measurements turn the CALIBRATOR switch to the desired range and place the DETECTOR INPUT switch in the MEASURE position. It may be necessary to move the HFM tuning control to eliminate spurious beat notes.

Heterodyne Frequency Meter

The heterodyine frequency meter (H.F.M.) consists of a Colpitts oscillator operating on seven fundamental ranges. Scales with black masks are fundamental ranges while the red masks are harmonic ranges. The COMPENSATOR control is provided for zero beating the H.F.M. with the crystal check points. The interpolator scale test control provides a smoothly controlable change in frequency without the need of disturbing the main tuning control. This is useful in determining the sense of the beat note. Turning this control will reduce the H.F.M. frequency.

Placing the detector input switch in the MEASURE position allows you to adjust the H.F.M. against the crystal calibrator. Also, in this position, the difference in frequency between an unknown signal applied to the r.f. input connector and the crystal calibrator is directly read out on the interpolator dial. The sense (whether the signal is above or below the check point) is determined by means of the INTERPOLATOR SCALE TEST control. As an example, say you zero beat the H.F.M. against the crystal calibrator at 5.120 mc (calibrator in the 20 kc position). An unknown signal is fed in and meter M_{101} reads 6 kc on the lower scale. Turning the INTERPOLATOR SCALE TEST control you observe that the reading on M_{101} drops. This indicates that the H.F.M. is above the unknown signal and therefore the signal is 5.114 mc.

Placing the detector input switch in the MATCH position permits you to zero beat the H.F.M. with an external unknown frequency.

Measuring Audio Frequencies

The LR-1 can be used as an audio frequency meter by connecting the unknown signal to J_{103} (INTERPOLATOR INPUT). Use a standard phone plug and connect the hot side to the tip. The input is a high impedance (about 500K ohms). Place the interpolator scale selector switch in the lower position and read the audio frequency directly from the lower scale.

[*Continued on page 102*]

The LR-1 *[from page 28]*

Generating Audio Frequencies

Audio frequencies in the range of 0 to 5.5 kc can be derived from the calibration oscillator and the H.F.M. Place the CALIBRATOR switch in the 20 kc position. Place the H.F.M. in range 1 (160 to 232 kc). Place the DETECTOR INPUT switch in the MEASURE position. With the interpolator test switch in the lower position adjust the H.F.M. frequency control to zero beat with any harmonic of the calibration oscillator near the middle of the band. Advance the H.F.M. frequency control and read the audio frequency from the lower scale of M_{101}. The audio output is obtained from the telephone jacks J_{101} or J_{102}. ■

20 Meter Yagi *[from page 78]*

most complicated detail of the yagi assembly, it is still a relatively simple task. Any medium spaced capacitor with about 100mmf value will work well. It is important, however, that the rotor plates have a full 360 degree motion and the capacitor circular motion have only the slightest degree of drag. In the original installation, an old ARC-5 tuning capacitor with several plates removed worked perfectly. Since the capacitor is series installed it is important that the unit be insulated above the boom ground potential as well as being insulated from the synchronous motor. The capacitor frame is placed on a sheet of polystyrene and the shaft series insulated from the motor shaft with a short length of dowel or a flexible coupling and fibre shafts. If dowel is used each dowel-end is drilled with the proper diameter bit in order to slip snugly onto the respective shafts. A small amount of Duco cement more than adequately secures the units.

The synchronous motor is the standard 110 v.a.c. unit with about 1-2 r.p.m. The rather slow movement will allow for an accurate determination of the lowest s.w.r.

The input end of the circuit can either utilize a standard coaxial connector or a porcelain feedthrough insulator. Neither one offers any particular advantage. The gamma matching rod is soldered to the center of the mating PL-259 connector. *No connection* is made to the shell of the plug. Use an insulated length of #12 or #10 copper wire terminated 42" from the driven element center for the 50 ohm terminus along the element length. All internal Minibox connections are made with a similar gauge. Simply solder one lead to the stator and the other lead to the rotor section.

For the gamma rod support, a 1×6" length of polystyrene is fastened on the driven element about midway along the gamma rod's length. A small (1") clamp secures the support and insulator. At the other end drill a small hole and tie the rod to the insulator with a small piece of twine. At the far end of the gamma rod (42" point) bend a length of copper sheeting around the terminus point and secure with a nut and bolt. At the far end of the sheeting (6") solder the gamma rod to the copper stock to complete the installation. These details are shown in fig. 2.

The extra length boom presents a support problem; consequently, the need for a length of nylon rope support. About midway along the length of the boom extensions secure a clamp for the support tie point and install a turnbuckle for any subsequent sag adjustments. A mast extension of about 3-4' is adequate.

Final Adjustment

Coat all joints with Krylon spray to assure a continuation of low resistance inter-element conductivity and a consistent impedance load. Make all final measurements with the antenna at its normal operating height. Connect power to energize the motor-capacitor drive. For those with a remote rotor installation, remove two wires from the rotor cable at the tower and jump them to the drive motor. Remove the same two wires (follow color code) at the control panel. Remember the rotor is now inoperative but it does eliminate the burden of stringing a temporary line. Experience has shown the antenna to reflect a rather constant input characteristic, so a permanent line to the synchronous motor is not really an absolute necessity. The amateur can either adjust the system for maximum signal detection (from a known and stable source using an S-meter) or simply concentrate on the lowest s.w.r. value. Expect a ratio of 1.5:1 or less and a front-to-back ratio in excess of 35 db with a properly tuned unit at a moderate height.

Every care has been taken to insure an inexpensive yet rugged antenna system comparable to the finest commercial counterparts. Even in the extreme cases of low antenna heights and adjacent power absorbing obstacles, the system will cancel out the reactance factor and produce a signal worthy of the serious amateur antenna builder. ■

Radio Club *[from page 17]*

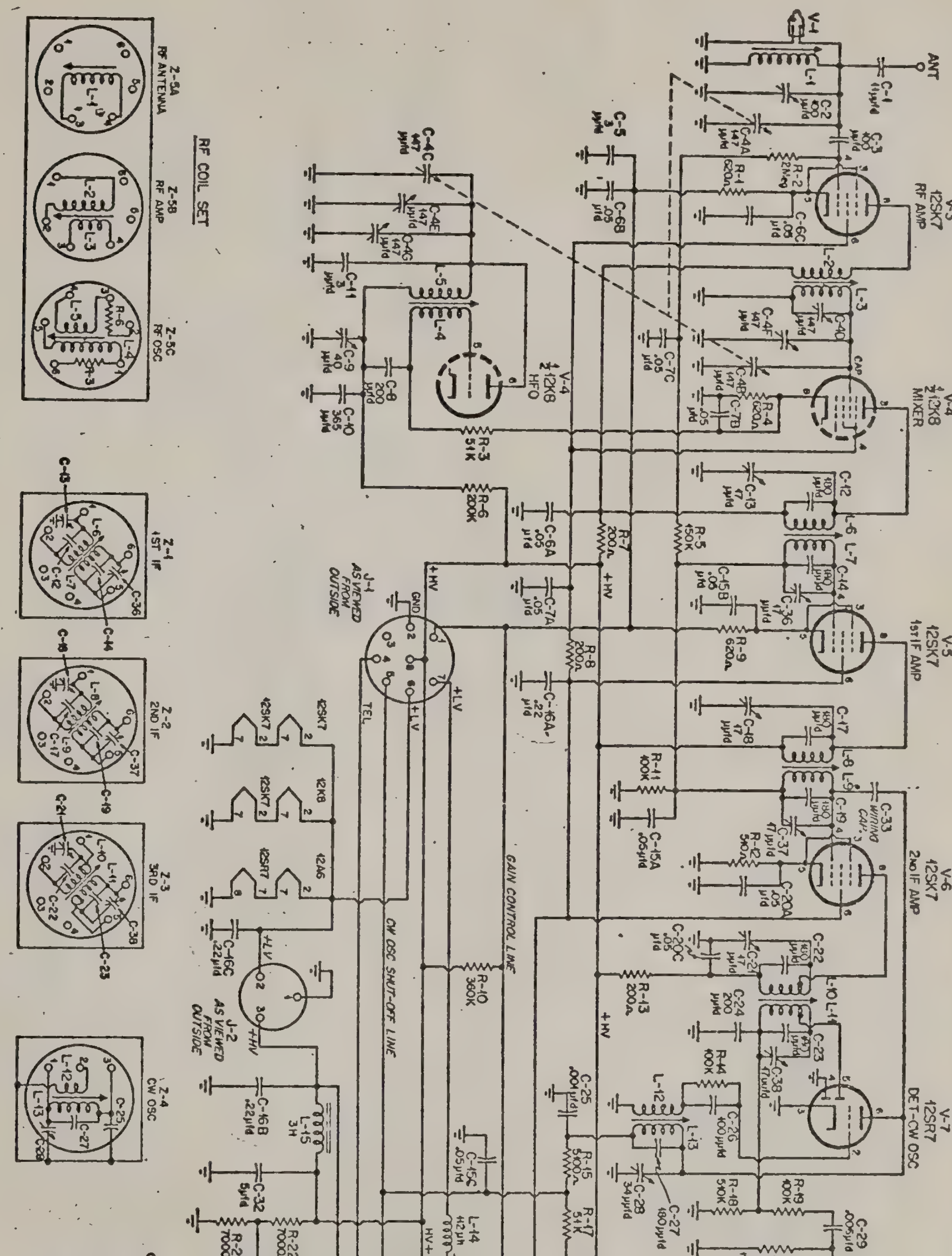
visitors applying for foreign membership are required to pay a "small cup round table". This means the purchase of a small cup of coffee for each member present at the meeting where the applicant is introduced. The cost usually amounts to about $2.

Radio amateurs visiting Helsinki are cordially invited to attend the daily meetings of the Café de Colombia Radio Club, and take part in the club's activities. This is an excellent opportunity to enjoy luncheon with members of the world's most active radio club. Radio amateurs interested in becoming members of the Club, can obtain additional information as well as a list of present members from: Café de Colombia Radio Club c/o SRAL, Box 10306 Helsinki 10, Finland. ■

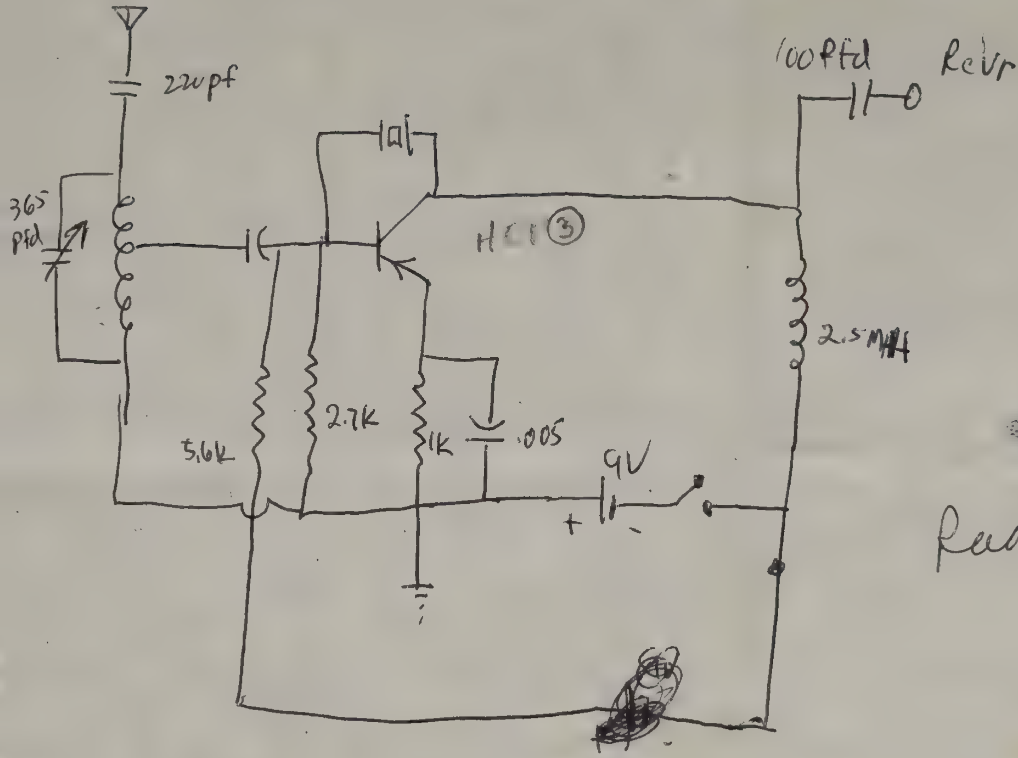
Transistorized Converters *[from page 40]*

recovery computer diodes make even better multipliers, usually with lower resistor values than the 82K value shown in fig. 4. This resistor can

R CVR



ANT
V-3 12SK7 RF AMP
V-4 ½ 12K8 MIXER
V-4 ½ 12K8 HFO
V-5 12SK7 1st IF AMP
V-6 12SK7 2ND IF AMP
V-7 12SR7 DET-CW OSC
V-8 12A6 AUDIO AMP
GAIN CONTROL LINE
CW OSC SHUT-OFF LINE
+ SCREEN VOLTAGE
J-1 AS VIEWED FROM OUTSIDE
J-2 AS VIEWED FROM OUTSIDE
J-3 AS VIEWED FROM OUTSIDE
RF COIL SET
Z-5A RF ANTENNA
Z-5B RF AMP
Z-5C RF OSC
Z-1 1ST IF
Z-2 2ND IF
Z-3 3RD IF
Z-4 CW OSC
T-1 OUTPUT TRANSFORMER

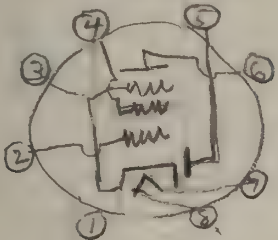


Radio Elec

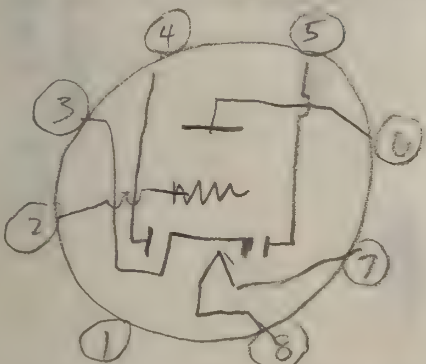
Mar 1970

Page 50-52

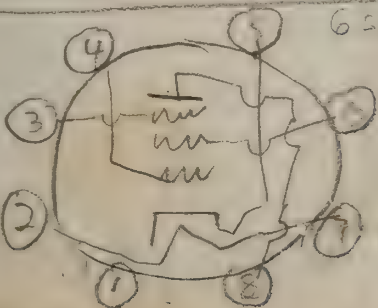
7A2 6SF7 diode remote cutoff pentode



6SR7 8Q



6SK7 8N



$\boxed{12SF7}$ - to $\boxed{12SK7}$

(6) Plate wire to (8)

(5) Diode wire to [illegible] (5+3)

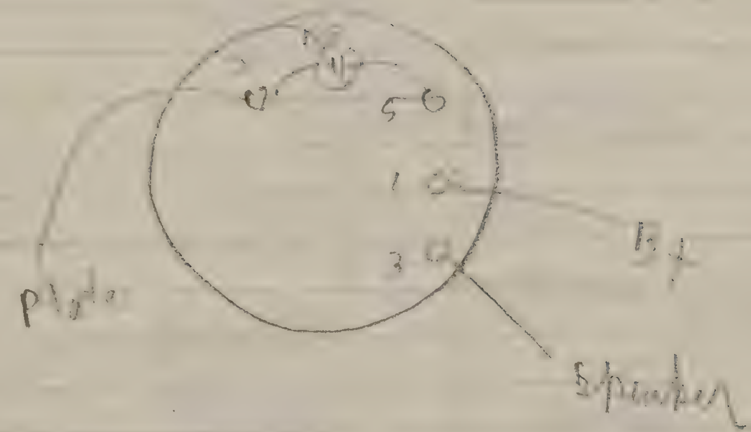
(4) Screen wire to (6)

(3) Cathode wire to (5) & (3)

(7) & (8) Fil wire to (2) & (7)

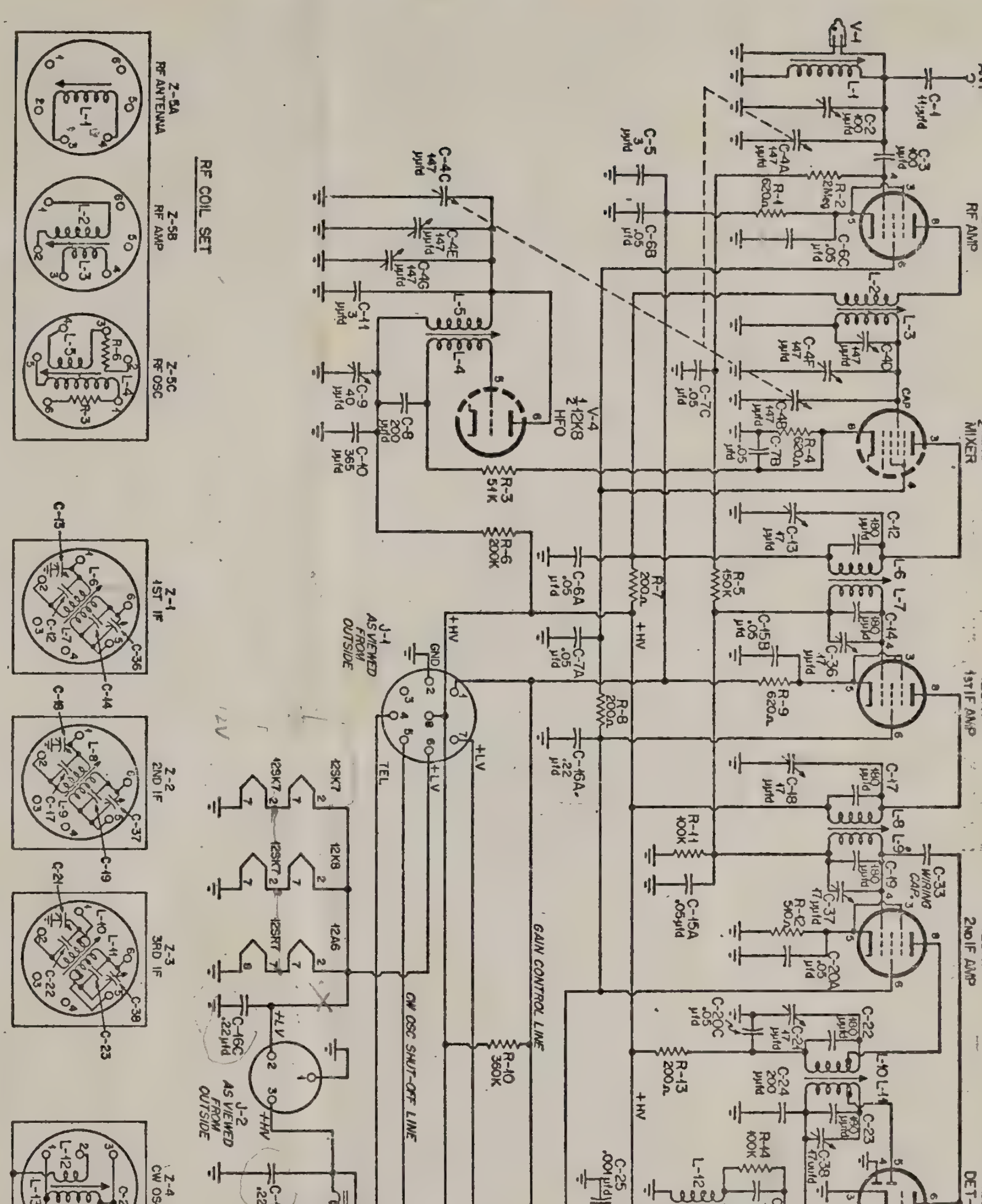
(1) shell wire to (1)

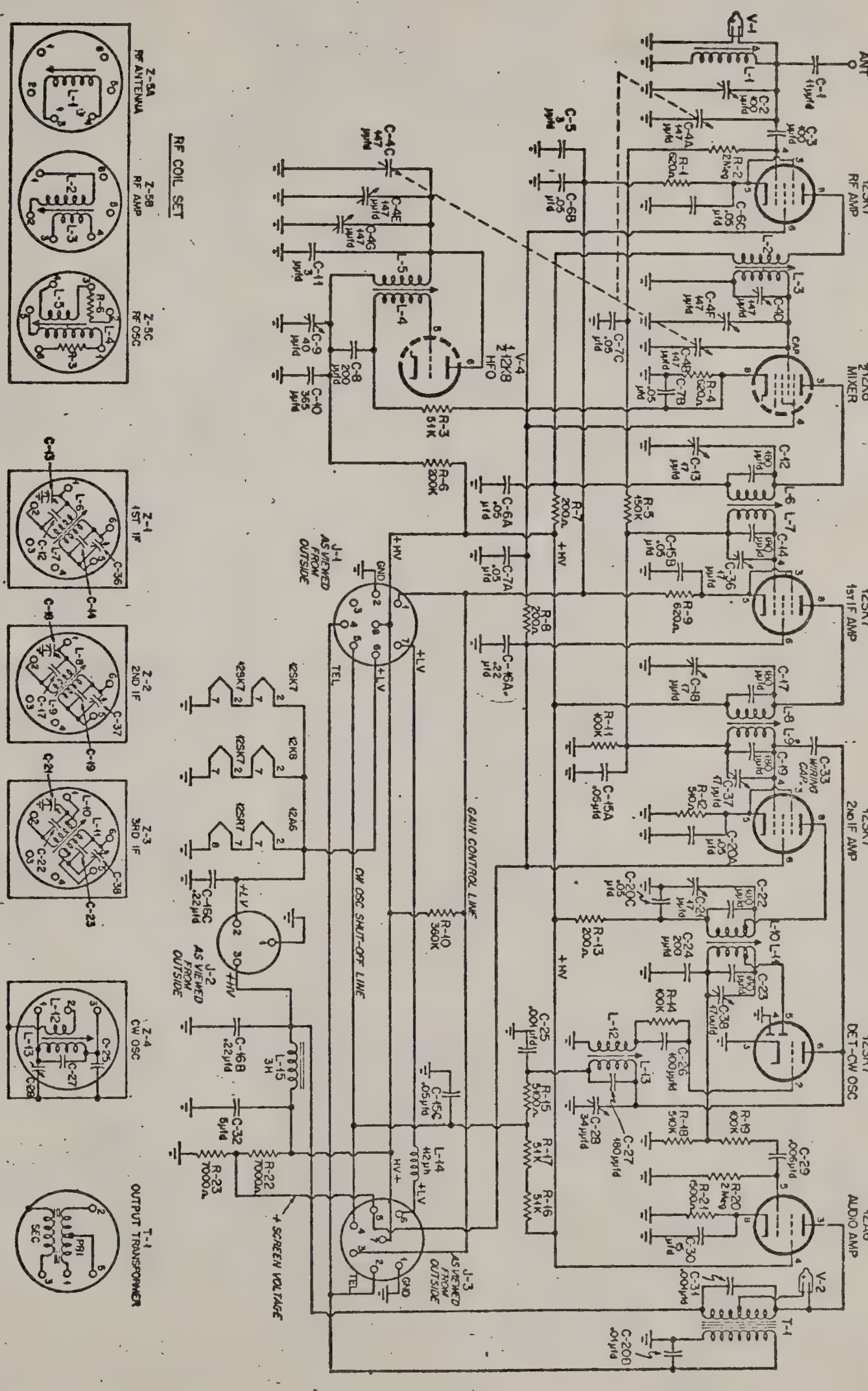
(2) grid wire to (4)


5
1
3
B+
Speaker
Plate

CW - off - pin 5 to gnd

Gain 10K pot from pin 1 to grid

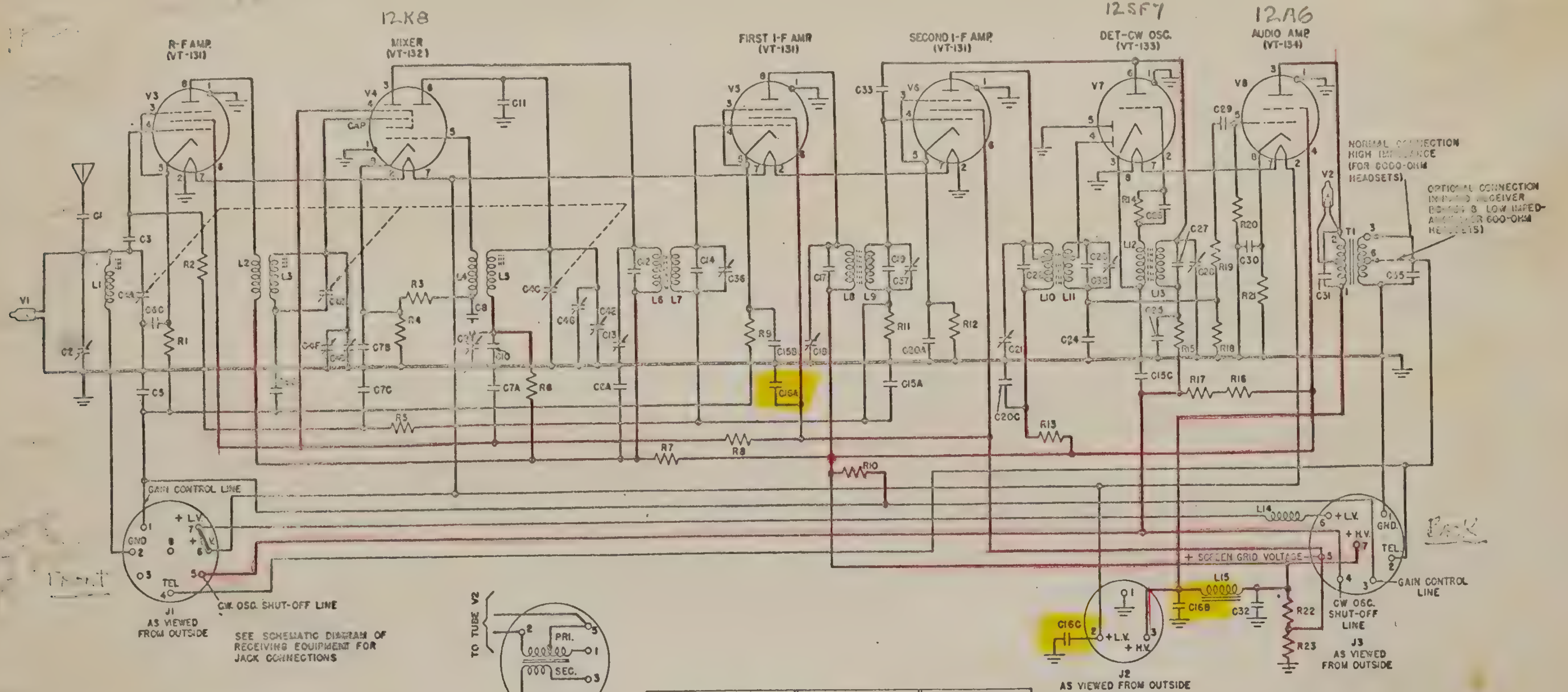




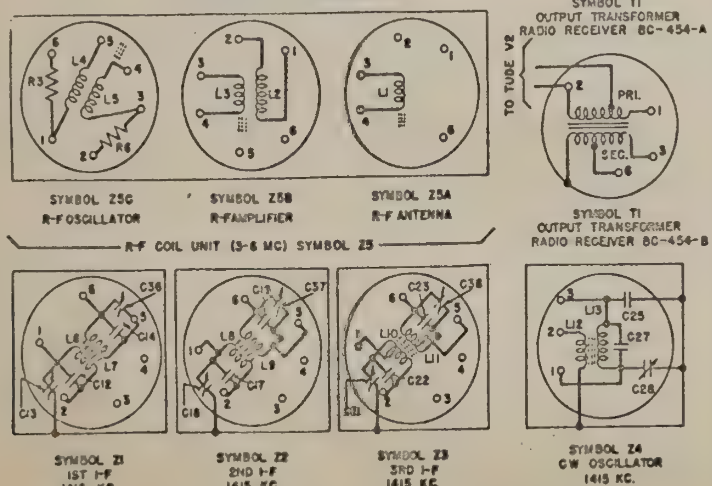
RF COIL SET
Z-5A RF ANTENNA
Z-5B RF AMP
Z-5C RF OSC
Z-1 1ST IF
Z-2 2ND IF
Z-3 3RD IF
Z-4 CW OSC
T-1 OUTPUT TRANSFORMER
ANT
V-3 12SK7 RF AMP
V-4 ½ 12K8 MIXER
V-4 ½ 12K8 HFO
V-5 12SK7 1st IF AMP
V-6 12SK7 2nd IF AMP
V-7 12SR7 DET-CW OSC
V-8 12A6 AUDIO AMP
GAIN CONTROL LINE
CW OSC SHUT-OFF LINE
+ SCREEN VOLTAGE
J-1 AS VIEWED FROM OUTSIDE
J-2 AS VIEWED FROM OUTSIDE
J-3 AS VIEWED FROM OUTSIDE

BC 454-A

Radio Receiver BC-454-A (or -B) (3-6 MC) Schematic



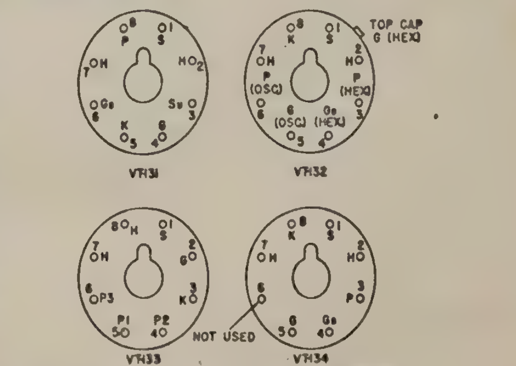
DETAIL SCHEMATIC DIAGRAMS COIL ASSEMBLIES AND TRANSFORMERS



CIRCUITS IN R COIL SET, I-F COUPLING UNITS, CW OSCILLATOR, AND OUTPUT TRANSFORMER. THE TERMINAL NUMBERS ON THESE UNITS AGREE WITH THOSE SHOWN AT THE CORRESPONDING LOCATIONS ON THE PRACTICAL WIRING DIAGRAM.

CAPACITORS		INDUCTORS		RESISTORS	
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	OHMS
C1	11 MMF.	L1	ANT. INPUT	R1	620
C2	15 MMF	L2, L3	RF AMP.	R2	2,000,000
C3	100 MMF.	L4, L5	RF OSC.	R3	51,000
C4 (A TO G)	GANG (147 MMF)	L6, L7	IN 1ST IF	R4	620
C5	3 MF	L8, L9	IN 2ND IF	R5	150,000
C6 (A,B,C)	.05/.05/.05 MF	L10, L11	IN 3RD IF	R6	200,000
C7 (A,B,C)	.05/.05/.05 MF	L12, L13	CW OSC.	R7	200
C8	200 MMF.	L14	RF CHOKE, 112	R8	200
C9	40 MMF		MICRO-HENRIES	R9	620
C10	365 MMF			R10	360,000
C11	3 MMF.	L15	AF CHOKE	R11	100,000
C12	180 MMF.		3 HENRIES	R12	510
C13	17 MMF.			R13	200
C14	180 MMF.			R14	100,000
C15 (A,B,C)	.05/.05/.05 MF			R15	5100
C16 (A,B,C)	.22/.22/.22 MF			R16	51,000
C17	180 MMF.			R17	51,000
C18	17 MMF.			R18	510,000
C19	180 MMF.			R19	100,000
C20 (A,B,C)	.05/.05/.05 MF			R20	2,000,000
C21	17 MMF			R21	1500
C22	180 MMF			R22	7000
C23	180 MMF.			R23	7000
C24	200 MMF.				
C25	.001 MF				
C26	100 MMF.				
C27	180 MMF.				
C28	34 MMF.				
C29	.006 MF.				
C30	15 MF.				
C31	.001 MF				
C32	5 MF.				
C33	*				
C35	750 MMF.				
C36	17 MMF.				
C37	17 MMF.				
C38	17 MMF.				

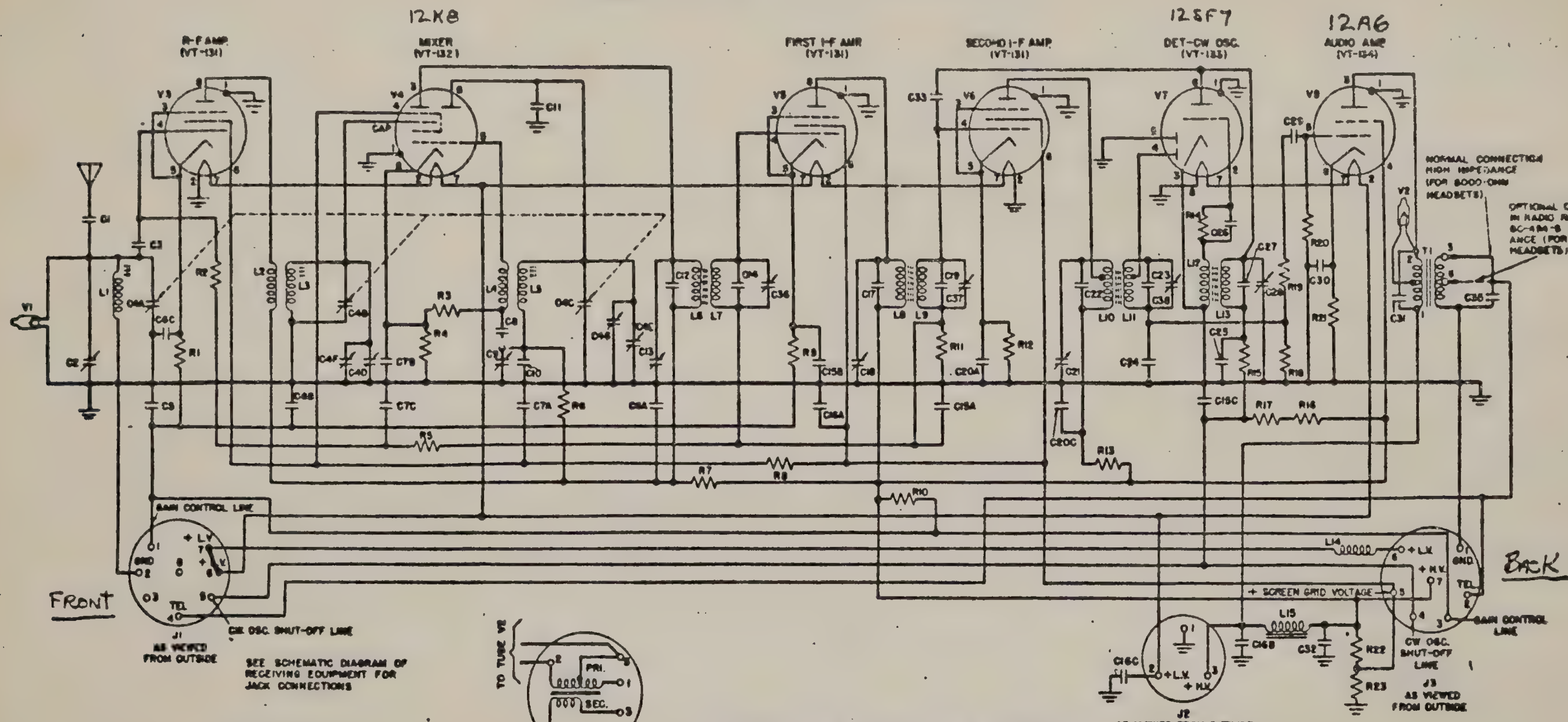
* WIRING CAPACITANCE (LESS THAN 2 MMF.).

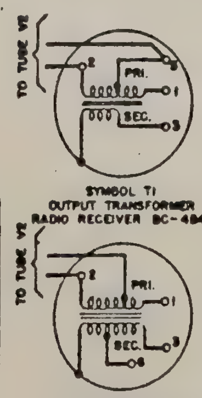


TUBE SOCKET TERMINALS AS VIEWED FROM BOTTOM

G = CONTROL GRID
G (HEX) = CONTROL GRID, HEXODE SECTION
G (OSC) = CONTROL GRID, OSC SECTION
Gs = SCREEN GRID
Gs (HEX) = SCREEN GRID, HEXODE SECTION
H = HEATER
K = CATHODE
P = PLATE
P (HEX) = PLATE, HEXODE SECTION
P (OSC) = PLATE, OSC. SECTION
P1 = FIRST DIODE PLATE
P2 = SECOND DIODE PLATE
P3 = TRIODE PLATE ON TUBE VT-133
S = SHELL
Su = SUPPRESSOR GRID

RADIO RECEIVER BC-454-A (OR -B) (3-6 MC) SCHEMATIC

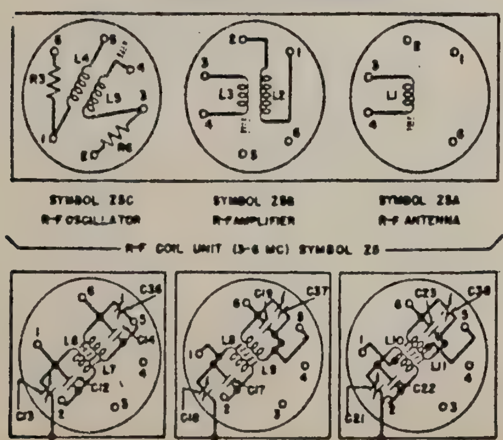




SYMBOL T1 OUTPUT TRANSFORMER RADIO RECEIVER BC-454-A

SYMBOL T1 OUTPUT TRANSFORMER RADIO RECEIVER BC-454-B

DETAIL SCHEMATIC DIAGRAMS COIL ASSEMBLIES AND TRANSFORMERS



SYMBOL Z3C R-F OSCILLATOR — SYMBOL Z3B R-F AMPLIFIER — SYMBOL Z3A R-F ANTENNA

R-F COIL UNIT (3-6 MC) SYMBOL Z3

SYMBOL Z1 1ST I-F 1415 KC — SYMBOL Z2 2ND I-F 1415 KC — SYMBOL Z3 3RD I-F 1415 KC — SYMBOL Z4 CW OSCILLATOR 1415 KC.

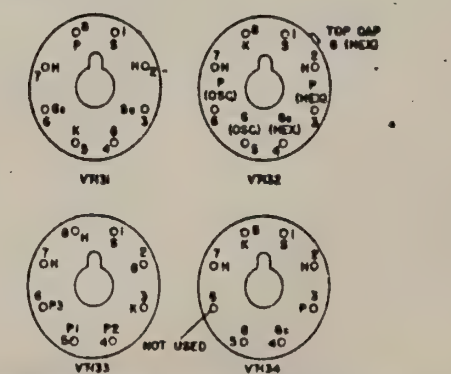
I-F COUPLING UNITS

CIRCUITS IN R-F COIL SET, I-F COUPLING UNITS, C W OSCILLATOR, AND OUTPUT TRANSFORMER. THE TERMINAL NUMBERS ON THESE UNITS AGREE WITH THOSE SHOWN AT THE CORRESPONDING LOCATIONS ON THE PRACTICAL WIRING DIAGRAM.

CAPACITORS		INDUCTORS		RESISTORS	
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	OHMS
C1	11 MMF.	L1	ANT. INPUT	R1	820
C2	15 MMF	L2, L3	RF AMP.	R2	2,000,000
C3	100 MMF.	L4, L5	RF OSC.	R3	51,000
C4 (A TO E)	GANG (147 MMF)	L6, L7	IN 1ST IF	R4	820
C5	3 MF	L8, L9	IN 2ND IF	R5	180,000
C6 (A,B,C)	.05/.05/.05 MF	L10, L11	IN 3RD IF	R6	200,000
C7 (A,B,C)	.05/.05/.05 MF	L12, L13	CW OSC.	R7	200
C8	200 MMF.	L14	RF CHOKE, 112	R8	200
C9	40 MMF		MICRO-HENRIES	R9	820
C10	385 MMF.	L15	AF CHOKE	R10	360,000
C11	3 MMF		3 HENRIES	R11	100,000
C12	180 MMF			R12	510
C13	17 MMF.			R13	200
C14	180 MMF			R14	100,000
C15 (A,B,C)	.05/.05/.05 MF			R15	5100
C16 (A,B,C)	.22/.22/.22 MF			R16	51,000
C17	180 MMF.			R17	51,000
C18	17 MMF.			R18	510,000
C19	180 MMF			R19	100,000
C20 (A,B,C)	.05/.01/.05 MF			R20	2,000,000
C21	17 MMF			R21	1500
C22	180 MMF			R22	7000
C23	180 MMF.			R23	7000
C24	200 MMF.				
C25	.001 MF				
C26	100 MMF.				
C27	180 MMF.				
C28	34 MMF.				
C29	.006 MF.				
C30	15 MF				
C31	.001 MF				
C32	3 MF.				
C33	*				
C35	780 MMF.				
C36	17 MMF.				
C37	17 MMF.				
C38	17 MMF.				

Less than

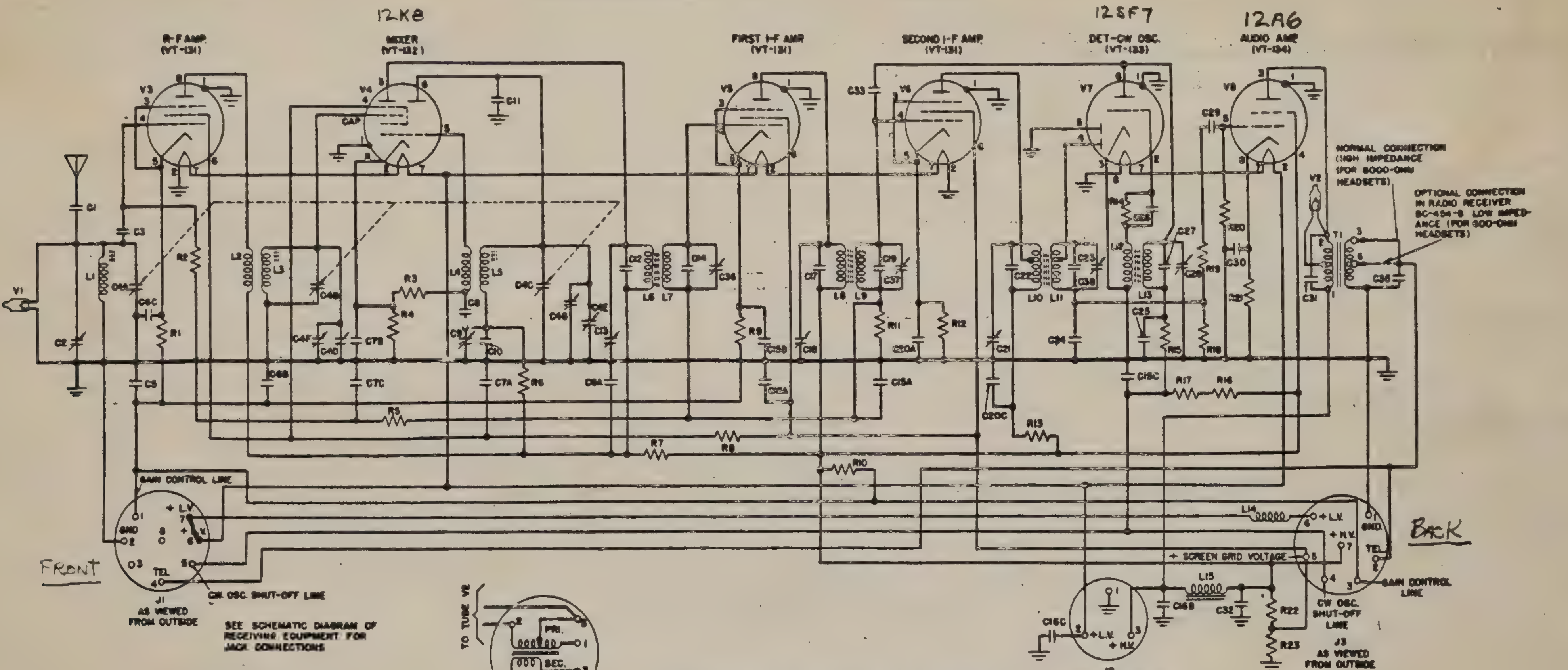
* WIRING CAPACITANCE (LE[illegible]N 2 MMF).



TUBE SOCKET TERMINALS AS VIEWED FROM BOTTOM

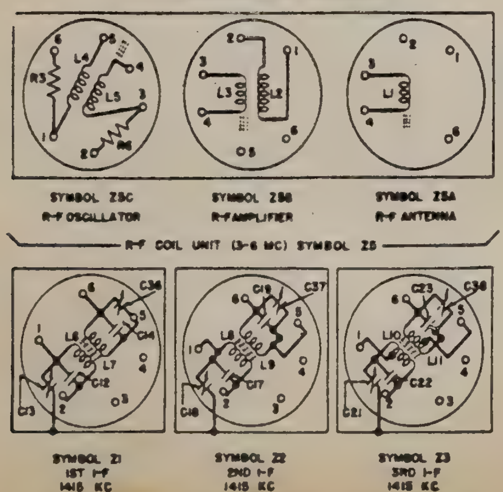
G = CONTROL GRID
G (HEX) = CONTROL GRID, HEXODE SECTION
G (OSC) = CONTROL GRID, OSC SECTION
Gs = SCREEN GRID
Gs (HEX) = SCREEN GRID, HEXODE SECTION
H = HEATER
K = CATHODE
P = PLATE
P (HEX) = PLATE, HEXODE SECTION
P (OSC) = PLATE, OSC SECTION
P1 = FIRST DIODE PLATE
P2 = SECOND DIODE PLATE
P3 = TRIODE PLATE ON TUBE VT-133
S = SHELL
Su = SUPPRESSOR GRID

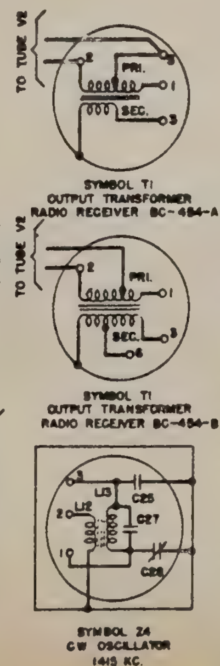
Radio Receiver BC-454-A (or -B) (3-6 MC) Schematic



SEE SCHEMATIC DIAGRAM OF RECEIVING EQUIPMENT FOR JACK CONNECTIONS

DETAIL SCHEMATIC DIAGRAMS
COIL ASSEMBLIES AND TRANSFORMERS

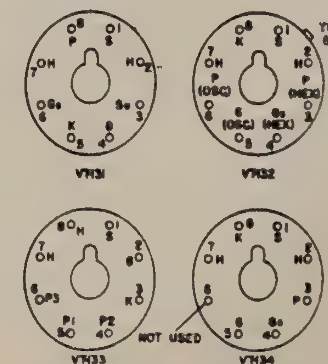




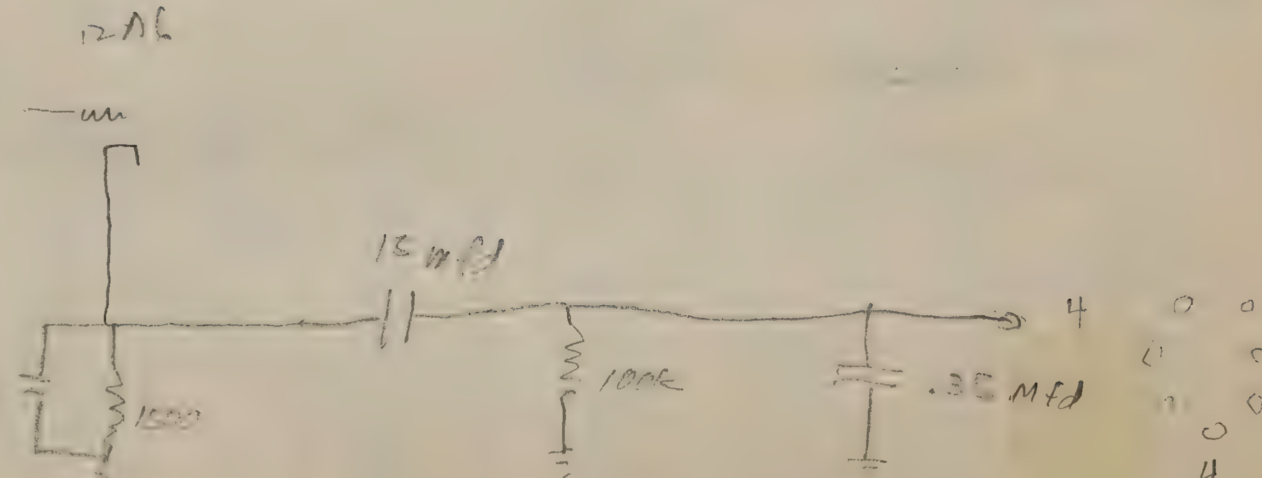
CIRCUITS IN R-F COIL SET, I-F COUPLING UNITS, C W OSCILLATOR, AND OUTPUT TRANSFORMER. THE TERMINAL NUMBERS ON THESE UNITS AGREE WITH THOSE SHOWN AT THE CORRESPONDING LOCATIONS ON THE PRACTICAL WIRING DIAGRAM.

CAPACITORS		INDUCTORS		RESISTORS	
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	OHMS
C1	11 MMF.	L1	ANT. INPUT	R1	620
C2	15 MMF.	L2, L3	RF AMP.	R2	2,000,000
C3	100 MMF.	L4, L5	RF OSC.	R3	51,000
C4 (A TO G)	GANG (147 MMF.)	L6, L7	IN 1ST IF	R4	620
C5	3 MF	L8, L9	IN 2ND IF	R5	150,000
C6 (A,B,C)	.05/.05/.05 MF	L10, L11	IN 3RD IF	R6	200,000
C7 (A,B,C)	.05/.05/.05 MF	L12, L13	CW OSC.	R7	200
C8	200 MMF.	L14	RF CHOKE, 112	R8	200
C9	40 MMF.		MICRO-HENRIES	R9	620
C10	385 MMF.	L15	AF CHOKE	R10	360,000
C11	3 MMF.		3 HENRIES	R11	100,000
C12	180 MMF.			R12	510
C13	17 MMF.			R13	200
C14	180 MMF.			R14	100,000
C15 (A,B,C)	.05/.05/.05 MF			R15	5100
C16 (A,B,C)	.22/.22/.22 MF			R16	51,000
C17	180 MMF.			R17	51,000
C18	17 MMF.			R18	510,000
C19	180 MMF.			R19	100,000
C20 (A,B,C)	.05/.01/.05 MF			R20	2,000,000
C21	17 MMF			R21	1500
C22	180 MMF			R22	7000
C23	180 MMF.			R23	7000
C24	200 MMF.				
C25	.001 MF				
C26	100 MMF				
C27	100 MMF.				
C28	34 MMF.				
C29	.006 MF.				
C30	15 MF.				
C31	.001 MF				
C32	5 MF.				
C33	*				
C35	750 MMF.				
C36	17 MMF.				
C37	17 MMF.				
C38	17 MMF.				

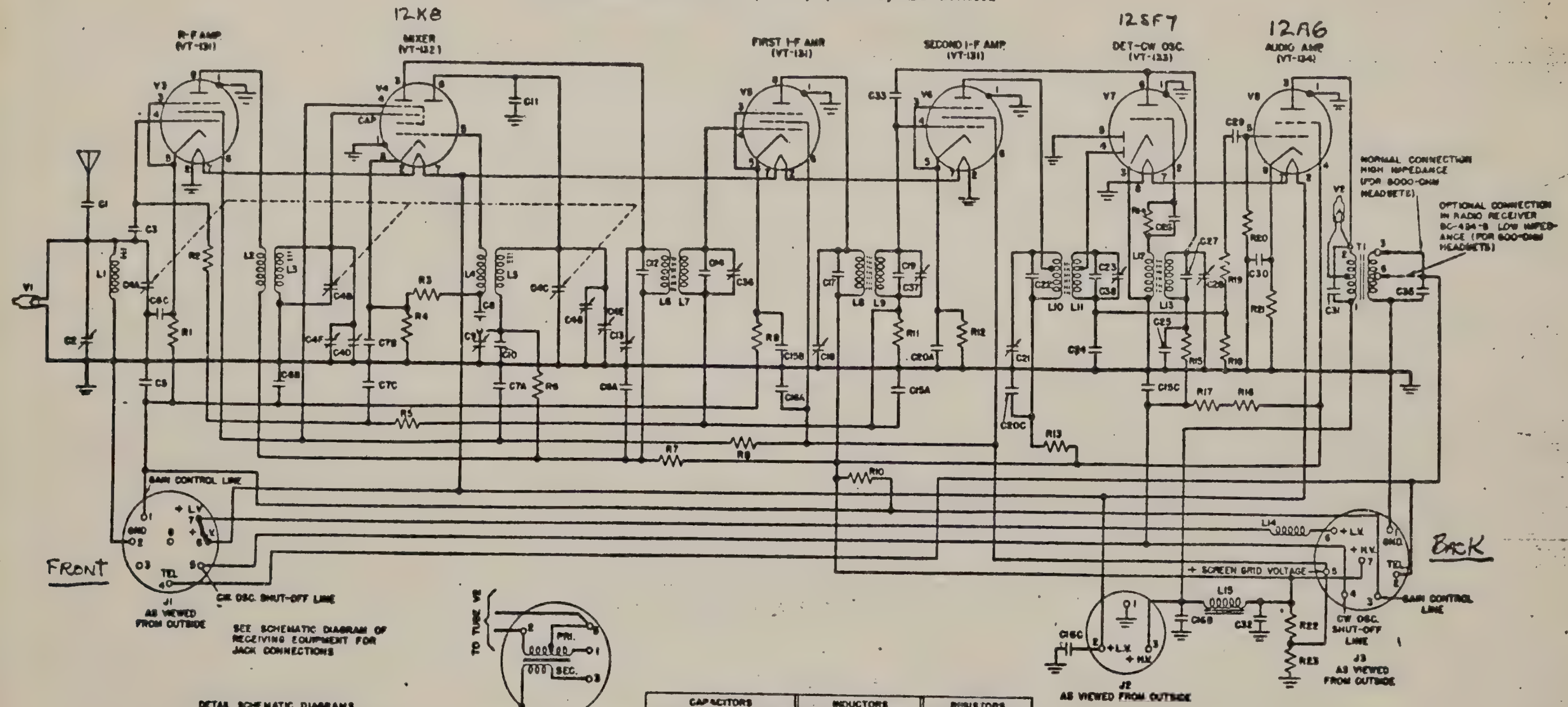
* WIRING CAPACITANCE (LESS THAN 2 MMF.).



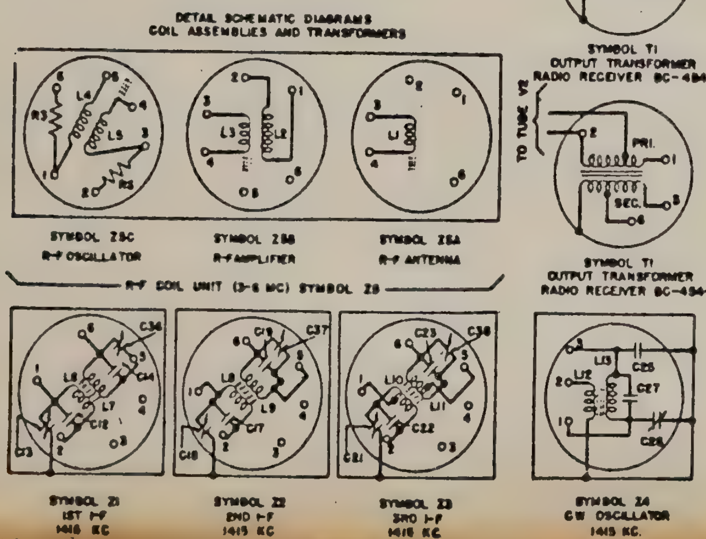
TUBE SOCKET TERMINALS AS VIEWED FROM BOTTOM
G=CONTROL GRID
G (HEX)=CONTROL GRID, HEXODE SECTION
G (OSC)=CONTROL GRID, OSC SECTION
Gs=SCREEN GRID
Gs (HEX)=SCREEN GRID, HEXODE SECTION
H=HEATER
K=CATHODE
Gu=SUPPRESSOR GRID
P=PLATE
P (HEX)=PLATE, HEXODE SECTION
P (OSC)=PLATE, OSC SECTION
P1=FIRST DIODE PLATE
P2=SECOND DIODE PLATE
P3=TRIODE PLATE ON TUBE VT-133
S=SHELL


15 Mfd
100k
.35 Mfd
1500
4

Radio Receiver BC-454-A (or -B) (3-6 MC) Schematic



DETAIL SCHEMATIC DIAGRAMS
COIL ASSEMBLIES AND TRANSFORMERS

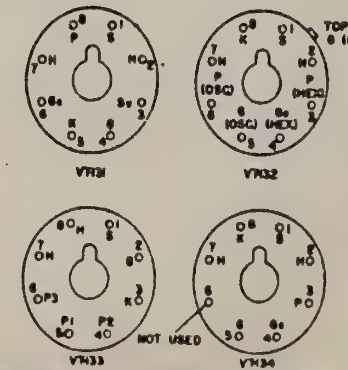


CIRCUITS IN R-F COIL SET, I-F COUPLING UNITS, C W OSCILLATOR, AND OUTPUT TRANSFORMER. THE TERMINAL NUMBERS ON THESE UNITS AGREE WITH THOSE SHOWN AT THE CORRESPONDING LOCATIONS ON THE PRACTICAL WIRING DIAGRAM.

CAPACITORS		INDUCTORS		RESISTORS	
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	OHMS
C1	11 MMF.	L1	ANT. INPUT	R1	620
C2	15 MMF	L2, L3	RF AMP.	R2	2,000,000
C3	100 MMF.	L4, L5	RF OSC.	R3	51,000
C4 (A TO E)	GANG (147 MMF)	L6, L7	IN 1ST IF	R4	620
C5	3 MF	L8, L9	IN 2ND IF	R5	150,000
C6 (A,B,C)	.05/.05/.05 MF	L10, L11	IN 3RD IF	R6	200,000
C7 (A,B,C)	.05/.05/.05 MF	L12, L13	CW OSC.	R7	200
C8	200 MMF.	L14	RF CHOKE, 112 MICRO-HENRIES	R8	200
C9	40 MMF			R9	620
C10	385 MMF.	L15	AF CHOKE 3 HENRIES	R10	360,000
C11	3 MMF			R11	100,000
C12	180 MMF			R12	510
C13	17 MMF.			R13	200
C14	180 MMF			R14	100,000
C15 (A,B,C)	.05/.05/.05 MF			R15	5100
C16 (A,B,C)	.22/.22/.22 MF			R16	51,000
C17	180 MMF.			R17	51,000
C18	17 MMF.			R18	510,000
C19	180 MMF.			R19	100,000
C20 (A,B,C)	.05/.01/.05 MF			R20	2,000,000
C21	17 MMF			R21	1500
C22	180 MMF			R22	7000
C23	180 MMF.			R23	7000
C24	200 MMF.				
C25	.001 MF				
C26	100 MMF				
C27	180 MMF.				
C28	34 MMF.				
C29	.006 MF.				
C30	15 MF				
C31	.001 MF				
C32	3 MF.				
C33	*				
C35	750 MMF.				
C36	17 MMF.				
C37	17 MMF.				
C38	17 MMF.				

LESS THAN 2

* WIRING CAPACITANCE (LESS THAN 2 MMF.)



TUBE SOCKET TERMINALS AS VIEWED FROM BOTTOM
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G (OSC) = CONTROL GRID, OSC SECTION
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H = HEATER
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P = PLATE
P (HEX) = PLATE, HEXODE SECTION
P (OSC) = PLATE, OSC SECTION
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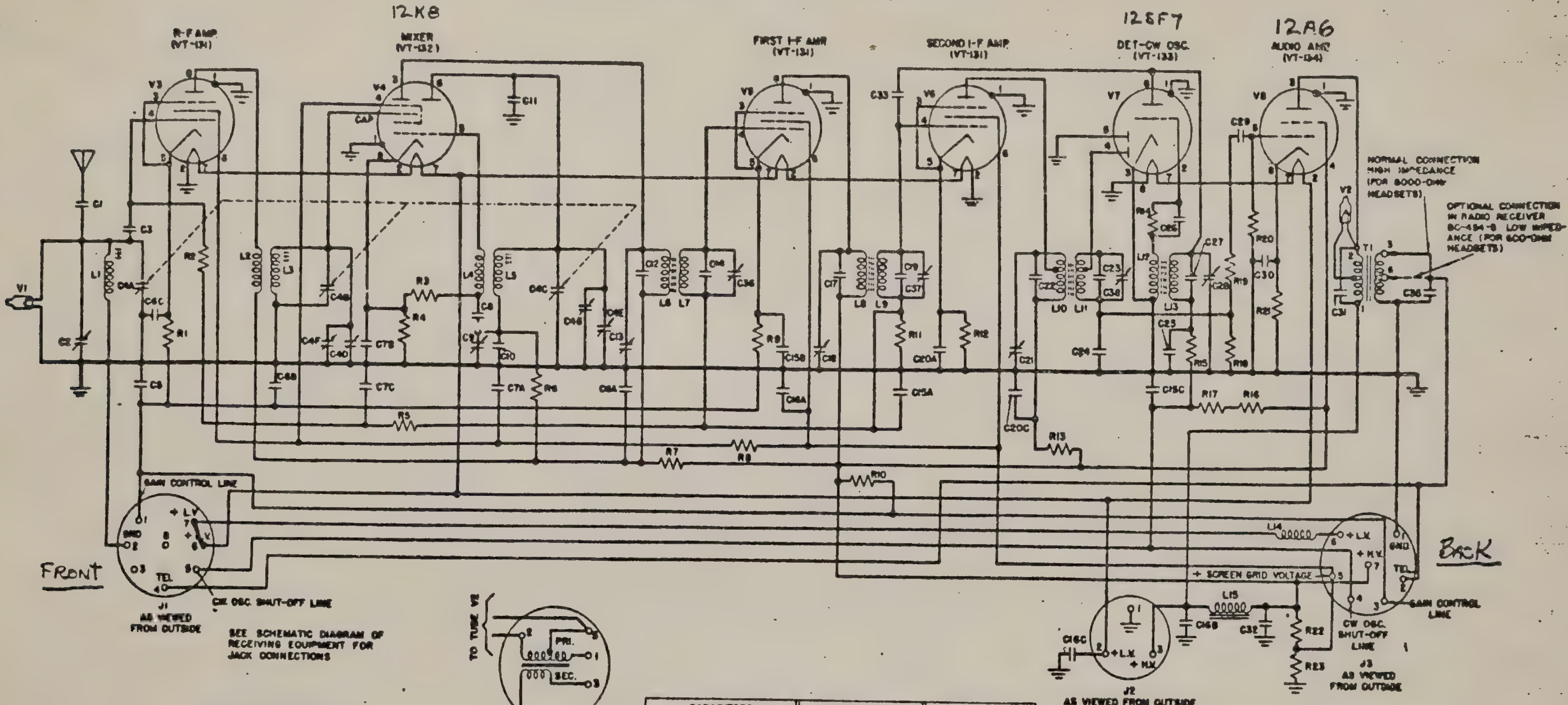
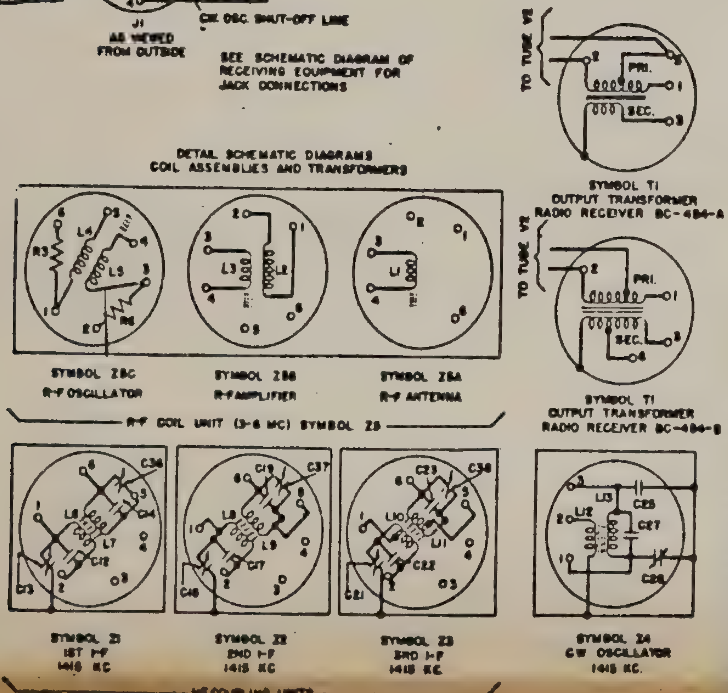
P2 = SECOND DIODE PLATE
P3 = TRIODE PLATE ON TUBE VT-133
S = SHELL
Su = SUPPRESSOR GRID

Radio Receiver BC-454-A (or -B) (3-6 mc) Schematic



SEE SCHEMATIC DIAGRAM OF RECEIVING EQUIPMENT FOR JACK CONNECTIONS

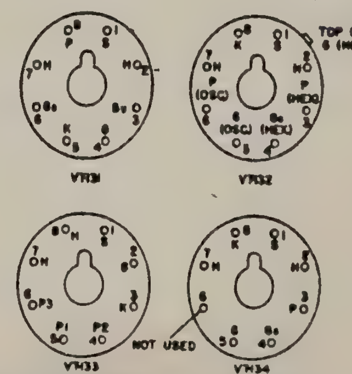
DETAIL SCHEMATIC DIAGRAMS
COIL ASSEMBLIES AND TRANSFORMERS



CIRCUITS IN R... COIL SET, I-F COUPLING UNITS, C W OSCILLATOR, AND OUTPUT TRANSFORMER. THE TERMINAL NUMBERS ON THESE UNITS AGREE WITH THOSE SHOWN AT THE CORRESPONDING LOCATIONS ON THE PRACTICAL WIRING DIAGRAM.

CAPACITORS		INDUCTORS		RESISTORS	
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	OHMS
C1	11 MMF.	L1	ANT. INPUT	R1	820
C2	15 MMF	L2, L3	RF AMP.	R2	2,000,000
C3	100 MMF.	L4, L5	RF OSC.	R3	51,000
C4 (A TO D)	GANG (147 MMF)	L6, L7	IN 1ST IF	R4	820
C5	3 MF	L8, L9	IN 2ND IF	R5	150,000
C6 (A,B,C)	.05/.05/.05 MF	L10, L11	IN 3RD IF	R6	200,000
C7 (A,B,C)	.05/.05/.05 MF	L12, L13	CW OSC.	R7	200
C8	200 MMF.	L14	RF CHOKE, 112	R8	200
C9	40 MMF		MICRO-HENRIES	R9	820
C10	385 MMF			R10	360,000
C11	3 MMF	L15	AF CHOKE	R11	100,000
C12	180 MMF		3 HENRIES	R12	510
C13	17 MMF.			R13	200
C14	180 MMF			R14	100,000
C15 (A,B,C)	.05/.05/.05 MF			R15	5100
C16 (A,B,C)	.22/.22/.22 MF			R16	51,000
C17	180 MMF.			R17	51,000
C18	17 MMF			R18	510,000
C19	180 MMF			R19	100,000
C20 (A,B,C)	.05/.01/.05 MF			R20	2,000,000
C21	17 MMF			R21	1500
C22	180 MMF			R22	7000
C23	180 MMF.			R23	7000
C24	200 MMF.				
C25	.001 MF				
C26	100 MMF				
C27	180 MMF.				
C28	34 MMF.				
C29	.006 MF.				
C30	15 MF				
C31	.001 MF				
C32	—				
C33	*				
C33	750 MMF.				
C36	17 MMF.				
C37	17 MMF.				
C38	17 MMF.				

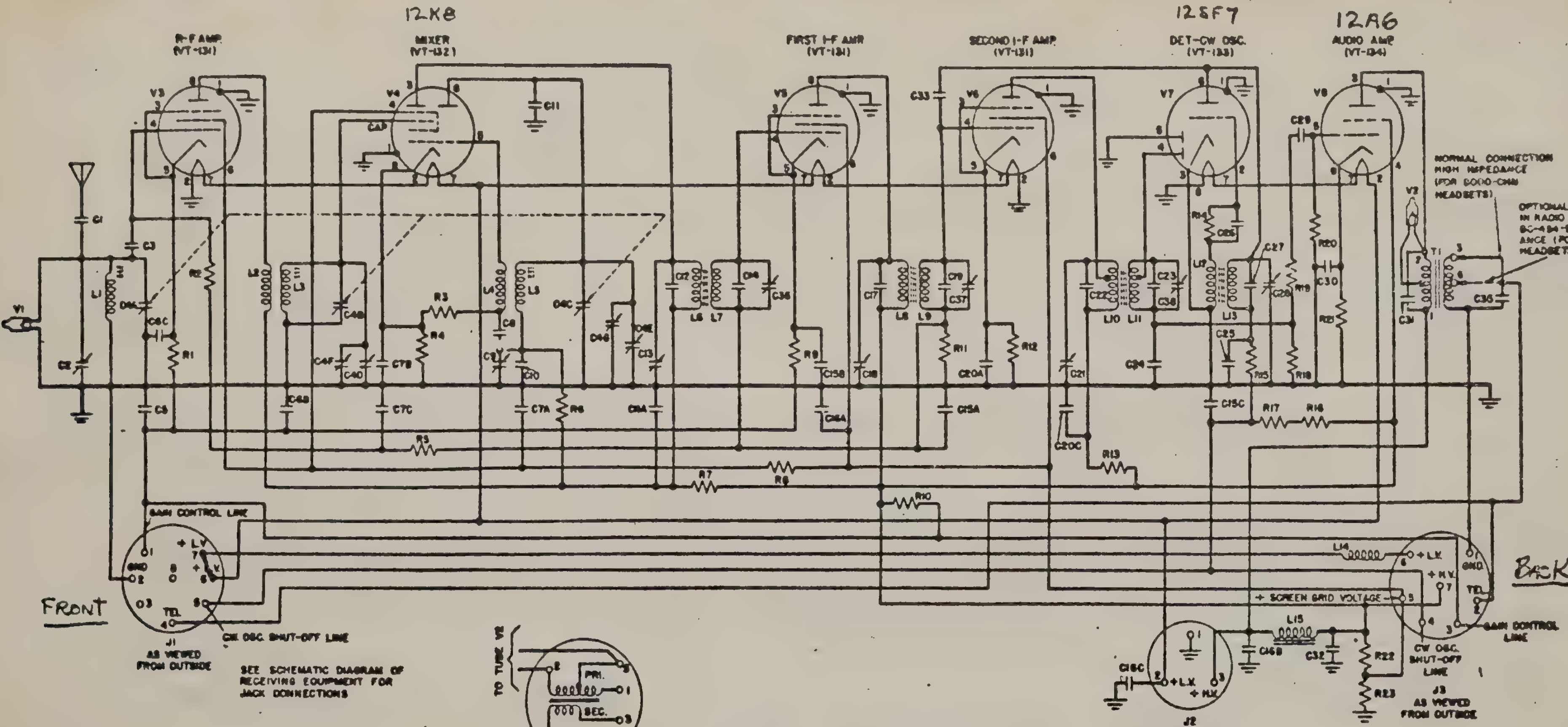
* WIRING CAPACITANCE (LESS THAN ... 5 MMF.)

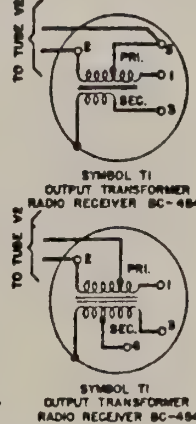


TUBE SOCKET TERMINALS AS VIEWED FROM BOTTOM

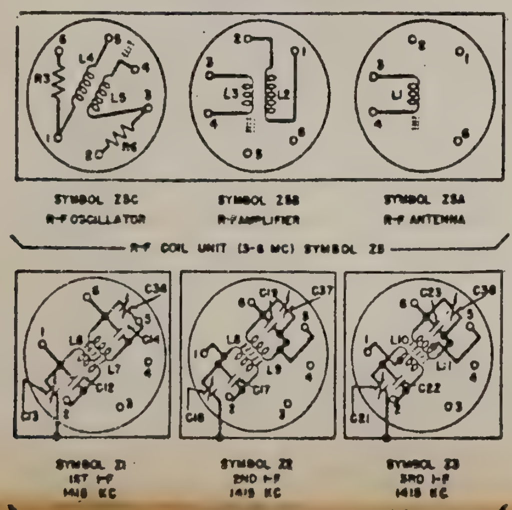
G = CONTROL GRID
G (HEX) = CONTROL GRID, HEXODE SECTION
G (OSC) = CONTROL GRID, OSC SECTION
Gs = SCREEN GRID
Gs (HEX) = SCREEN GRID, HEXODE SECTION
H = HEATER
K = CATHODE
P = PLATE
P (HEX) = PLATE, HEXODE SECTION
P (OSC) = PLATE, OSC SECTION
P1 = FIRST DIODE PLATE
P2 = SECOND DIODE PLATE
P3 = TRIODE PLATE ON TUBE VT-133
S = SHELL
Su = SUPPRESSOR GRID

RADIO RECEIVER BC-454-A (OR -B) (3-6 MC) SCHEMATIC





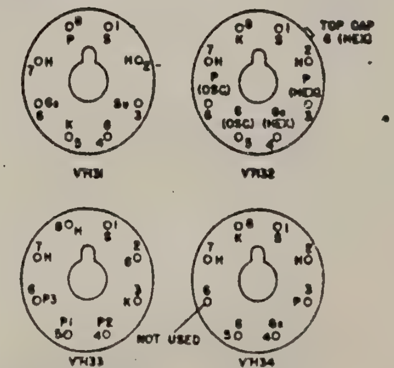
DETAIL SCHEMATIC DIAGRAMS
COIL ASSEMBLIES AND TRANSFORMERS



CIRCUITS IN R-F COIL SET, I-F COUPLING UNITS, CW OSCILLATOR, AND OUTPUT TRANSFORMER. THE TERMINAL NUMBERS ON THESE UNITS AGREE WITH THOSE SHOWN AT THE CORRESPONDING LOCATIONS ON THE PRACTICAL WIRING DIAGRAM.

CAPACITORS		INDUCTORS		RESISTORS	
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	OHMS
C1	11 MMF.	L1	ANT. INPUT	R1	620
C2	15 MMF	L2, L3	RF AMP.	R2	2,000,000
C3	100 MMF.	L4, L5	RF OSC.	R3	51,000
C4 (A TO G)	GANG (147 MMF)	L6, L7	IN 1ST IF	R4	620
C5	3 MF	L8, L9	IN 2ND IF	R5	150,000
C6 (A,B,C)	.05/.05/.05 MF	L10, L11	IN 3RD IF	R6	200,000
C7 (A,B,C)	.05/.05/.05 MF	L12, L13	CW OSC.	R7	200
C8	200 MMF.	L14	RF CHOKE, 112 MICRO-HENRIES	R8	200
C9	40 MMF			R9	620
C10	365 MMF.	L15	AF CHOKE 3 HENRIES	R10	360,000
C11	3 MMF			R11	100,000
C12	180 MMF.			R12	510
C13	17 MMF.			R13	200
C14	180 MMF			R14	100,000
C15 (A,B,C)	.05/.05/.05 MF			R15	5100
C16 (A,B,C)	.22/.22/.22 MF			R16	51,000
C17	180 MMF			R17	51,000
C18	17 MMF.			R18	510,000
C19	180 MMF.			R19	100,000
C20 (A,B,C)	.05/.01/.05 MF			R20	2,000,000
C21	17 MMF			R21	1500
C22	180 MMF.			R22	7000
C23	180 MMF.			R23	7000
C24	200 MMF.				
C25	.001 MF				
C26	100 MMF.				
C27	180 MMF.				
C28	34 MMF				
C29	.006 MF.				
C30	15 MF				
C31	.001 MF				
C32	3 MF.				
C33	*				
C35	750 MMF.				
C36	17 MMF.				
C37	17 MMF.				
C38	17 MMF.				

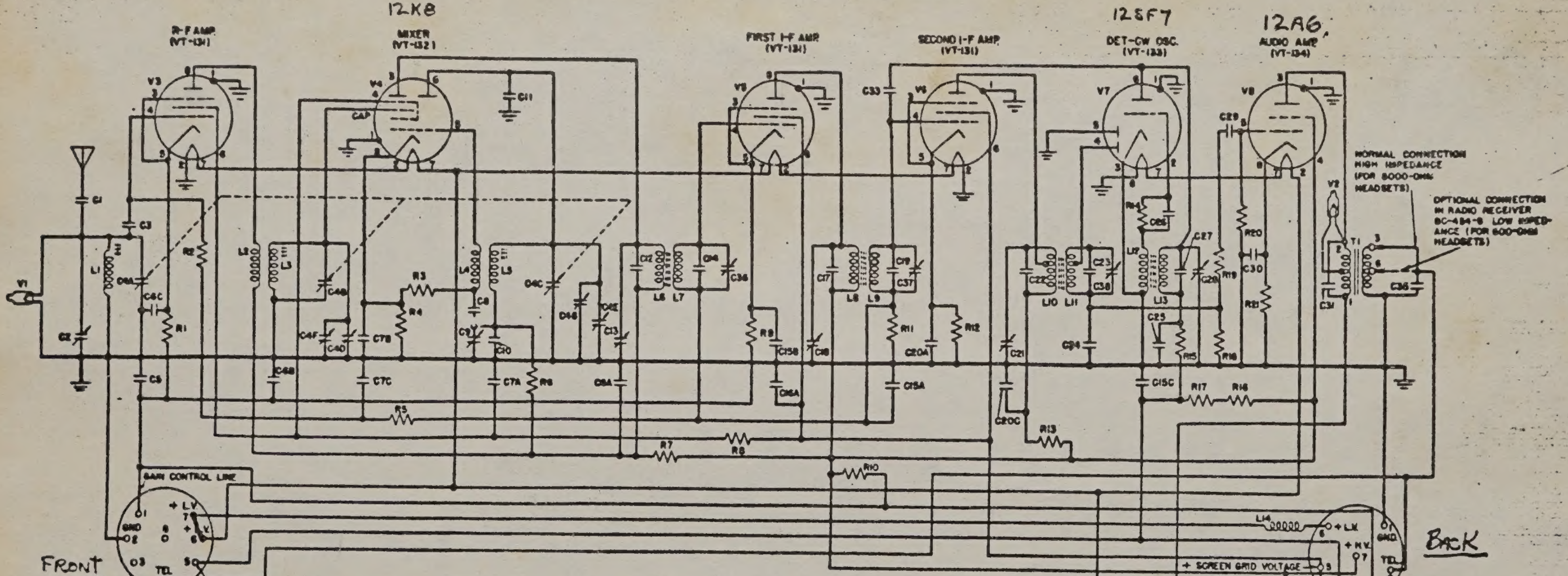
* WIRING CAPACITANCE (LESS THAN [illegible] MMF.)



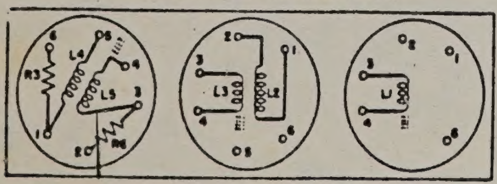
TUBE SOCKET TERMINALS AS VIEWED FROM BOTTOM

G = CONTROL GRID
G (HEX) = CONTROL GRID, HEXODE SECTION
G (OSC) = CONTROL GRID, OSC SECTION
Gs = SCREEN GRID
Gs (HEX) = SCREEN GRID, HEXODE SECTION
H = HEATER
K = CATHODE
P = PLATE
P (HEX) = PLATE, HEXODE SECTION
P (OSC) = PLATE, OSC SECTION
P1 = FIRST DIODE PLATE
P2 = SECOND DIODE PLATE
P3 = TRIODE PLATE ON TUBE VT-133
S = SHELL
Su = SUPPRESSOR GRID

Radio Receiver BC-454-A (or -B) (3-6 mc) Schematic



DETAIL SCHEMATIC DIAGRAMS
COIL ASSEMBLIES AND TRANSFORMERS

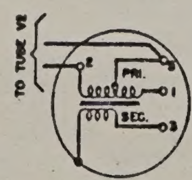


SYMBOL Z8C
R-F OSCILLATOR

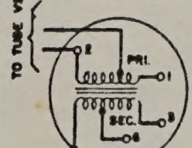
SYMBOL Z8B
R-F AMPLIFIER

SYMBOL Z8A
R-F ANTENNA

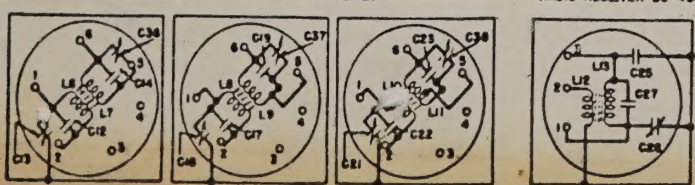
R-F COIL UNIT (3-6 MC) SYMBOL Z8



SYMBOL T1
OUTPUT TRANSFORMER
RADIO RECEIVER BC-454-A



SYMBOL T1
OUTPUT TRANSFORMER
RADIO RECEIVER BC-454-B



SYMBOL Z1
1ST I-F
1415 KC

SYMBOL Z2
2ND I-F
1415 KC

SYMBOL Z3
3RD I-F
1415 KC

SYMBOL Z4
CW OSCILLATOR
1415 KC.

I-F COUPLING UNITS

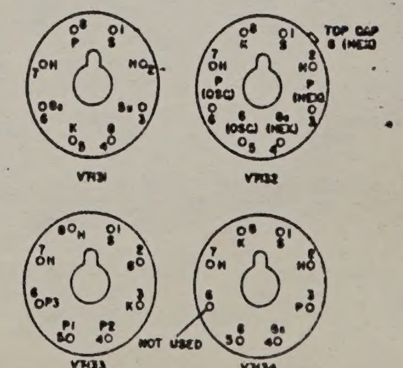
CIRCUITS IN R[illegible]L SET, I-F COUPLING UNITS, CW OSCILLATOR, AND OUTPUT TRANSFORMER. THE TERMINA[illegible]ERS ON THESE UNITS AGREE WITH THOSE SHOWN AT THE CORRESPONDING LOCATIONS O[illegible]RACTICAL WIRING DIAGRAM.

TH[illegible] PRACTICAL

CAPACITORS		INDUCTORS		RESISTORS	
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	OHMS
C1	11 MMF.	L1	ANT. INPUT	R1	620
C2	15 MMF.	L2, L3	RF AMP.	R2	2,000,000
C3	100 MMF.	L4, L5	RF OSC.	R3	51,000
C4 (A TO E)	GANG (147 MMF.)	L6, L7	IN 1ST IF	R4	620
C5	3 MF	L8, L9	IN 2ND IF	R5	160,000
C6 (A,B,C)	.05/.05/.05 MF	L10, L11	IN 3RD IF	R6	200,000
C7 (A,B,C)	.05/.05/.05 MF	L12, L13	CW OSC.	R7	200
C8	200 MMF.	L14	RF CHOKE, 112	R8	200
C9	40 MMF.		MICRO-HENRIES	R9	620
C10	385 MMF.			R10	360,000
C11	3 MMF.	L15	AF CHOKE	R11	100,000
C12	180 MMF.		3 HENRIES	R12	510
C13	17 MMF.			R13	200
C14	180 MMF.			R14	100,000
C15 (A,B,C)	.05/.05/.05 MF			R15	5100
C16 (A,B,C)	.22/.22/.22 MF			R16	51,000
C17	180 MMF.			R17	51,000
C18	17 MMF.			R18	510,000
C19	180 MMF.			R19	100,000
C20 (A,B,C)	.05/.01/.05 MF			R20	2,000,000
C21	17 MMF.			R21	1500
C22	180 MMF.			R22	7000
C23	180 MMF.			R23	7000
C24	200 MMF.				
C25	.001 MF				
C26	100 MMF.				
C27	180 MMF.				
C28	34 MMF.				
C29	.006 MF.				
C30	15 MF.				
C31	.001 MF				
C32	5 MF.				
C33	*				
C35	750 MMF.				
C36	17 MMF.				
C37	17 MMF.				
C38	17 MMF.				

* WIRING CAPACITANCE (LE[illegible] MMF.)

LE[illegible] THANZ



TUBE SOCKET TERMINALS AS VIEWED FROM BOTTOM

G = CONTROL GRID
G (HEX) = CONTROL GRID, HEXODE SECTION
G (OSC) = CONTROL GRID, OSC SECTION
G_s = SCREEN GRID
G_s (HEX) = SCREEN GRID, HEXODE SECTION
H = HEATER
K = CATHODE
P = PLATE
P (HEX) = PLATE, HEXODE SECTION
P (OSC) = PLATE, OSC SECTION
P1 = FIRST DIODE PLATE
P2 = SECOND DIODE PLATE
P3 = TRIODE PLATE ON TUBE VT-133
S = SHELL
S_u = SUPPRESSOR GRID